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Personal Narrative

OF TRAVELS

TO THE

EQUINOCTIAL REGIONS

OF THE

NEW CONTINENT,

DURING THE YEARS 1799—1804.

BY

ALEXANDER DE HUMBOLDT,

AND

AIMÉ BONPLAND;

WITH MAPS, PLANS, *&c.*

WRITTEN IN FRENCH BY

ALEXANDER DE HUMBOLDT,

AND TRANSLATED INTO ENGLISH BY

HELEN MARIA WILLIAMS.

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JOURNEY

TO THE

EQUINOCTIAL REGIONS

OF

THE NEW CONTINENT.

CHAPTER XX.

The Mouth of the Rio Anaveni.—Peak of Uniana.—Mission of Atures. Cataract, or Raudal *of Mapara.—Islets of Surupamana, and Uirapuri.*

The river of the Oroonoko, in running from south to north, is crossed by a chain of granitic mountains. Twice confined in it's course, it turbulently breaks on the rocks, that form steps and transverse dykes. Nothing can be grander than the aspect of this spot. Neither the fall of the Tequendama*, nor the magnificent scenes of the Cordilleras, could weaken the impression produced upon my mind by the first view of the

* Near Santa Fe de Bogota.

rapids of Atures and of Maypures. When you are so stationed, that the eye can at once take in the long succession of cataracts, the immense sheet of foam and vapours, illumined by the rays of the setting Sun, it seems as if you saw the whole river suspended over it's bed.

Scenes so astonishing must for ages have fixed the attention of the inhabitants of the new world. When Diego de Todaz, Alfonso de Herera, and the intrepid Raleigh, anchored at the mouth of the Oroonoko, they were informed by the Indians of the Great Cataracts, which they themselves had never visited, and which they even confounded with cascades farther to the east. Whatever obstacles the force of vegetation under the torrid zone may be to the intercourse among nations, all that relates to the course of great rivers acquires a celebrity, which extends to vast distances. The Oroonoko, the Amazon, and the Uruguay, traverse, like inland arms of seas, in different directions, a land covered with forests, and inhabited by tribes, part of whom are cannibals. It is not yet two hundred years since civilization, and the mild light of a more humane religion, have pursued their way along the banks of these ancient canals traced by the hand of nature; long however before the introduction of agriculture, before communications for the purpose of barter were established among these scattered and often

hostile tribes, the knowledge of extraordinary phenomena, of falls of water, of volcanic fires, and of snows resisting all the ardent heat of summer, was propagated by a thousand fortuitous circumstances. Three hundred leagues from the coast, in the centre of South America, among nations whose excursions do not extend to three days journey, we find an idea of the ocean, and words* that denote a mass of salt water extending as far as the eye can discern. Various events, which repeatedly occur in savage life, contribute to enlarge these conceptions. In consequence of the petty wars between neighbouring tribes, a prisoner is brought into a strange country, and treated as a *poito* or *mero*†, that is to say, as a slave. After having been repeatedly sold, he is dragged to new wars, escapes, and returns home; he relates what he has seen, and what he has heard from those, whose tongue he had been compelled to learn. Thus on discovering a coast, you hear of great inland animals‡; thus, on entering the valley of a vast river, you are surprised to find, that savages, who are strangers to navigation, have

* *Parava* in the Tamanac language. *Parana* in the Maypure.

† The first of these words belongs to the Caribbee language, the second to the Maypure tongue.

‡ *Cuvier, Anim. fossiles, Discours prélimin.*, p. 22.

acquired a knowledge of distant things. In the infant state of society, the exchange of ideas precedes to a certain point the exchange of productions.

The two great cataracts of the Oroonoko, of which the celebrity is so far spread and so ancient, are formed by the passage of the river across the mountains of Parima*. They are called by the natives *Mapara* and *Quittuna*; but the missionaries have substituted for these names those of Atures and Maypures, after the names of the first tribes, which they assembled together in the nearest villages. On the coast of Caraccas, the two Great Cataracts are denoted by the simple appellation of the two *Raudales*†, or rapids; a denomination which implies, that the other falls of water, even the rapids of Camiseta and of Carichana, are not considered as worthy of attention, when compared with the cataracts of Atures and Maypures.

These last, situate between five and six degrees of north latitude, and a hundred leagues west of the Cordilleras of New Grenada‡, in the meridian of Porto Cabello, are only twelve leagues distant from each other. It is surprising,

* See chap. xvii, vol. iv, p. 304.

† From the Spanish word *raudo*, rushing, *rapidus*.

‡ West of the Paramo of Zoraca, near Tunja, a town of New Granada.

that their existence was not known to d'Anville, who, in his large, fine map of South America, marks the inconsiderable cascades of Marimara and San Borja, by the names of the rapids of Carichana and Tabaje. The great Cataracts divide the Christian establishments of Spanish Guyana into two unequal parts. Those situate between the *Raudal* of Atures and the mouth of the river are called the missions of the lower Oroonoko; the missions of the upper Oroonoko comprehend the villages between the *Raudal* of Maypures, and the mountains of Duida*. The course of the lower Oroonoko, if we estimate the sinuosities with Mr. de la Condamine at one third of the distance in a direct line, is two hundred and sixty nautical leagues; the course of the upper Oroonoko, supposing it's sources to be three degrees east of Duida, includes one hundred and sixty-seven leagues.

Beyond the Great Cataracts an unknown land begins. The country is partly mountainous, and partly flat, receiving at once the confluents of the Amazon and the Oroonoko. From the facility of it's communications with the Rio Negro and the Gran Para, it appears to belong still more to Brazil than to the Spanish colonies.

* *Missiones del Alto y del Baxo Orinoco.* The missions of the Cassiquiare are not included in this statement, though this river forms a branch of the upper Oroonoko.

None of the missionaries, who have described the Oroonoko before me, neither Father Gumilla, Gili, nor Caulin, had passed the Raudal of Maypures. If the last have made known with some precision the topography of the upper Oroonoko, and the Cassiquiare, this information was obtained only from the military employed in the expedition of Solano. We found but three Christian establishments, above the Great Cataracts, along the shores of the Oroonoko, in an extent of more than a hundred leagues; and these three establishments contained scarcely six or eight white persons, that is to say, persons of European race. We cannot be surprised, that such a desert region should have been at all times the classical soil of fable and fairy visions. It is there, that grave missionaries have placed nations with one eye in the forehead, the head of a dog, or the mouth below the stomach. It is there they have found all that the ancients relate of the Garamantes, of the Arimaspes, and of the Hyperboreans. It would be an error to suppose, that these simple and often rustic missionaries had themselves invented all these exaggerated fictions; they derived them in great part from the recitals of the Indians. A fondness for narration prevails in the missions, as it does at sea, in the East, and in every place where the mind wants amusement. A missionary, from his vocation, is not inclined

to scepticism; he imprints on his memory what the natives have so often repeated to him; and, when returned to Europe, and restored to the civilized world, he finds a compensation for his toils in the pleasure of creating astonishment by a recital of facts, which he thinks he has collected, and by an animated description of remote things. These tales of *travellers* and of monks *(cuentos de viageros y frailes)* increase in improbability in proportion as you increase your distance from the forests of the Oroonoko, and approach the coasts, inhabited by the whites. When at Cumana, Nueva Barcelona, and other sea-ports, which have frequent communication with the missions, you betray any sign of incredulity, you are reduced to silence by these few words, "The fathers have seen it, but far above the Great Cataracts, *mas ariba de los Raudales*."

Entering a country so little frequented, and of which a part only has been described by those who passed through it, I have several motives for adhering to the journal form in my narrative. Under this form the reader will distinguish with greater facility what I had an opportunity of observing myself, and what I relate from the testimony of the missionaries and natives. He will follow the travellers in their daily occupations, and, appreciating at once the shortness of the time at their disposal, and the difficulties

they had to surmount, will judge them with more indulgence.

April the 15th. We left the Island of Panumana at four in the morning, two hours before sunrise. The sky was in great part obscured, and lightnings furrowed thick clouds at more than forty degrees of elevation. We were surprised at not hearing the sound of thunder; was it on account of the prodigious height of the storm? It appears to us, that in Europe the electric flashes without thunder, vaguely called heat lightning, are seen generally nearer the horizon. Under a cloudy sky, that sent back the radiant caloric of the soil, the heat was stifling; not a breath of wind agitated the foliage of the trees. The jaguars as usual had crossed the arm of the Oroonoko by which we were separated from the shore, and we heard their cries extremely near. During the night the Indians had advised us to quit our station in the open air, and retire to a deserted hut belonging to the *conucos* of the inhabitants of Atures. They had taken care to barricade the opening with planks, a precaution which seemed to us superfluous; but near the cataracts tigers are so numerous, that two years before, in these very *conucos* of Panumana, an Indian returning to his hut, toward the close of the rainy season, found a tigress settled in it with her two young. These animals had inhabited the dwelling for

several months; they were dislodged from it with difficulty, and it was only after an obstinate combat, that the former master could take possession of his house. The jaguars are fond of retiring to deserted ruins, and I believe it is more prudent in general for a solitary traveller to encamp in the open air, between two fires, than to seek shelter in uninhabited huts.

On quitting the island of Panumana, we perceived on the western bank of the river the fires of an encampment of Guahibo savages. The missionary, who accompanied us, caused a few musket-shots to be fired in the air, which he said was to intimidate them, and prove to them, that we were in a state to defend ourselves. The savages were no doubt destitute of canoes, and had no wish to trouble us in the middle of the river. We passed at sunrise the mouth of the Rio Anaveni, which descends from the eastern mountains. On it's banks, now deserted, father Olmos had established, in the time of the Jesuits, a small village of Japuins* or Jaruroes. The heat of the day was so powerful, that we rested a long time in a woody spot, to fish with a hook and line, and it was with some trouble we carried away all the fish we had caught. We did not arrive till very late at the foot of the Great Cataract, in a bay called the *lower*

* Gili, vol. 1, p. 36.

harbour ;* and we followed, not without difficulty, in a dark night, the narrow path, that leads to the mission of Atures, a league distant from the river. We crossed a plain covered with large blocks of granite.

The little village of *San Juan Nepomuceno de los Atures* was founded by the Jesuit Francisco Gonzalez † in 1748. In going up the river this is the last of the Christian establishments, that owe their origin to the order of St Ignatius. The more southern establishments, those of Atabapo, of Cassiquiare, and of Rio Negro, were formed by the fathers of the Observance of St. Francis. The Oroonoko appears to have flowed heretofore where the village of Atures now stands, and the flat savannah, that surrounds the village, no doubt made part of the bed of the river. I saw to the east of the mission a succession of rocks, that seemed to have formed the ancient shore of the Oroonoko. In the lapse of ages the river has been impelled toward the west, in consequence of the accumulation of earth, which occurs more frequently on the side of the eastern mountains, that are furrowed by torrents. The cataract bears the name of *Ma-*

* *Puerto de Abaxo.*

† And not by Father Olmos, as Caulin asserts in his *Chorographie.* Father Olmos was at Atures at the time of the *expedition of the boundaries*, and rendered it essential services.

*para**, as we have mentioned above; while the name of the village is derived from that of the nation of Atures, which is now believed to be extinct. I find on the maps of the seventeenth century *Island and Cataract of Athule*; which is the word *Atures* written according to the pronunciation of the Tamanacks, who confound, like so many other people, the consonants *l* and *r*. This mountainous region was so little known in Europe even in the middle of the eighteenth century, that d'Anville, in the first edition of his South America, makes a branch issue from the Oroonoko, near *Salto de los Atures*, and fall into the Amazon, to which branch he gives the name of Rio Negro.

Ancient maps, as well as Father Gumilla's

* I am ignorant of the etymology of this word, which I believe means only a *fall of water*. Gili translates into Maypure *a small cascade* (*raudalito*) by *uccamatisi mapara canacapatirri* (vol. 1, p. xxxix). Should we not spell this word *matpara*? *mat* being a radical of the Maypure tongue, and meaning *bad* (Hervas, *Saggio*, *n.* 29). The radical *par* (*para*) is found among American tribes more than five hundred leagues distant from each other, the Caribs, Maypures, Brazilians, and Peruvians, in the words *sea*, *rain*, *water*, *lake*. We must not confound *mapara* with *mapaja*; this last word signifies, in Maypure and Tamanack, the papaw or melon-tree, no doubt on account of the sweetness of it's fruit, for *mapa* means in the Maypure, as well as in the Peruvian and Omagua tongues, *the honey of bees*. The Tamanacks call a cascade, or raudal, in general *uatapurutpe*; the Maypures, *uca*.

work, place the mission in latitude 1° 30′. Abbé Gili gives it 3° 50′. I found* by meridian altitudes of Canopus, and α of the Southern Cross, 5° 38′ 4″ for the latitude; and by the time keeper 4h 41′ 17″ of longitude west of the meridian of Paris. The dip of the magnetic needle was on the 16th of April 32·25° (centesimal division). The intensity of the magnetic force was expressed by two hundred and twenty-three oscillations in 10′ of time, when it was at Paris by two hundred and forty-five oscillations.

We found this small mission in the most deplorable state. It contained even at the time of the expedition of Solano, commonly called the *expedition of the boundaries*, three hundred and twenty Indians. This number had diminished, at our passage by the Cataracts, to forty-seven; and the missionary assured us, that this

* *Obs. Astr.* vol. 1, p. 226. I took my observations near the small church of the mission. Don Jose Solano, the cosmographer of the expedition of the boundaries, had found (no doubt with quadrants not rectified by *inverting* the instrument, and without observing stars on the north and south) 5° 35′ (Caulin, p. 71). Father Gili (vol. 1, p. xxxii) thinks, that *the commissioners of the boundaries* stopped at 4° 18′ 22″. As he places Cabruta (the latitude of which place, inferred from that of the Capuchino, appears to me to be 7° 40′) in 5°, we cannot suppose, that he meant to write 5° 18′ instead of 4° 18′. Did he not rather deduce Cabruta from the erroneous position of Atures?

diminution became from year to year more sensible. He showed us, that in the space of thirty-two months only one marriage had been entered in the registers of the parish church. Two others had been contracted by uncatechized natives, and celebrated before the Indian *Governador*, to certify, as we say in Europe, the civil condition. At the first foundation of the mission, the Atures, Maypures, Meyepures, Abanis, and Quirupas, had been assembled together. Instead of these tribes we found only Guahiboes, and a few families of the nation of Macoes. The Atures* have almost entirely disappeared; they are no longer known, except by the tombs in the cavern of Ataruipe, which recall to mind the sepulchres of the Guanches at Teneriff. We learnt on the spot, that the Atures, as well as the Quaquas, and the Macoes or Piaroas, belonged to the great stock of the *Saliva* nations; while the Maypures, the Abanis, the Parenis, and the Guaypunnaves, are of the same race as

* "Already in my time," says Gili the missionary, "there did not exist above a score of Atures in the *raudal* of this name. We thought this nation almost extinct, there being no longer any of these Indians in the forest. Since this period, the military of the *expedition of the boundaries* assert, that they discovered a tribe of Atures on the east of the Esmeralda, between the rivers Padamo and Ocamu." (Gili, vol. i, p. 334. See also the map of Surville made for the works of Father Caulin.)

the *Cabres* or Caveres, celebrated for their long wars with the Caribs. In this labyrinth of petty nations, divided from one another as the nations of Latium, Asia Minor, and Sogdiana, formerly were, we can trace no general relations but by following the analogy of tongues. These are the only monuments, that have reached us from the early age of the world ; the only monuments, which, without being fixed to the soil, at once movable and lasting, have as it were traversed time and space. They owe their duration, and the extent they occupy, much less to conquering and polished nations, than to those wandering and half-savage tribes, who, fleeing before a powerful enemy, carried along with them in their extreme wretchedness only their wives, their children, and the idiom of their fathers.

Between the latitudes of 4° and 8°, the Orooonoko not only separates the great forest of the Parima from the bare savannahs of the Apure, Meta, and Guaviare, but also forms the boundary between tribes of very different manners. In the west, along plains destitute of trees, wander the Guahiboes, the Chiricoas, and the Guamoes; dirty and disgusting nations, proud of their savage independance, whom it is difficult to fix to the soil, or habituate to regular labor. The Spanish missionaries characterize them well by the name of *Indios andantes* (Indians who are always on the march, vagabond Indians). To

the east of the Oroonoko, between the neighbouring sources of the Caura, Cataniapo, and Ventuari, live the Macoes, the Salivas, the Curacicanas, Parecas, and Maquiritares, mild, tranquil tribes, addicted to agriculture, and easily subjected to the discipline of the missions. The *Indian of the plains* differs from the *Indian of the forests* in language as well as manners and mental disposition; both have an idiom that abounds in spirited and bold terms; but the language of the former is harsher, more concise, and more impassioned; that of the latter, softer, more diffuse, and fuller of ambiguous expressions.

The mission of Atures, like most of the missions of the Oroonoko, situate between the mouths of the Apure and the Atabapo, is composed of both the classes of tribes we have just described. We there find the Indians of the forests, and the Indians heretofore nomade* (*Indios monteros* and *Indios llaneros*, or *andantes*). We visited with the missionary the huts of Macoes, whom the Spaniards call Piraoas, and those of the Guahiboes. The first indicated

* I employ the word *nomade* as synonimous to *wandering*, and not in it's primitive signification. The wandering nations of America (those of the indigenous tribes it is to be understood) are never shepherds; they live by fishing and hunting, on the fruit of a few trees, the farinaceous medullary substance of palm-trees, &c.

more love of order, cleanliness, and ease. The independant Macoes (I would not denote them by the name of savages) have their *rochelas*, or fixed dwellings, two or three days' journey east of Atures, toward the sources of the little river Cataniapo. They are very numerous; cultivate, as most of the natives of the woods, not maize, but cassava; and live in great harmony with the Christian Indians of the mission. The harmony was established, and wisely cultivated by the Franciscan monk, Bernardo Zea. This Alcalde of the *reduced* Macoes quitted the village of Atures for a few months every year, to live in the plantations which he possessed in the midst of the forests near the hamlet of the independent Macoes. In consequence of this peaceful intercourse, many of the *Indios monteros* came and established themselves some time ago in the mission. They asked eagerly for knives, fishing hooks, and those coloured glass-beads, which, notwithstanding the positive prohibition of the priests, were employed not as necklaces, but as ornaments of the *guayuco**. Having obtained what they sought, they returned to the woods, weary of the regulations of the mission. Epidemic fevers, which prevailed with violence at the entrance of the rainy season, contributed greatly to this unexpected flight. In 1799 the

* *Perizoma.*

mortality was very considerable at Carichana, on the banks of the Meta, and at the Raudal of Atures. The Indian of the forest conceives a horror for the life of the civilized man, when, I will not say any misfortune befalls his family settled in the mission, but merely any disagreeable or unforeseen accident. Natives, who were neophytes, have been known to desert for ever the Christian establishments, on account of a great drought; as if this calamity would not have reached them equally in their plantations, had they remained in their primitive independence.

What are the causes of those fevers, that prevail during a great part of the year in the villages of Atures and Maypures, around the two Great Cataracts of the Oroonoko, and which render these spots so much to be dreaded by European travellers? They are violent heats joined with the excessive humidity of the air, bad nutriment, and, if we may believe the natives, the pestilent exhalations, that rise from the bare rocks of the *Raudales*. These fevers of the Oroonoko appeared to us to resemble altogether those, that are felt every year between New-Barcelona, La Guayra, and Porto-Cabello, in the vicinity of the sea; and often degenerate into adynamic fevers. "I have had my little fever (*mi calenturita*) only eight months," said the good missionary of the Atures, who accom-

panied us to the Rio Negro; speaking of it as of an habitual evil, which it was easy to bear. The fits were violent, but of short duration. He was sometimes seized with them when lying along in the boat under a shelter of branches of trees, sometimes when exposed to the burning rays of the sun on an open beach. These tertian agues are attended with great debility of the muscular system; yet we find poor ecclesiastics on the Oroonoko, who support for several years these *calenturitas*, or *tercianas*: their effects are not so fatal as those, which are experienced from fevers of much shorter duration in temperate climates.

I have just mentioned the noxious influence on the salubrity of the atmosphere, which is attributed by the natives, and even the missionaries, to the bare rocks. This opinion is the more worthy of attention, on account of it's being connected with a physical phenomenon lately observed in different parts of the globe, which has not yet been sufficiently explained. Among the cataracts, and wherever the Oroonoko, between the missions of Carichana and of Santa Barbara, periodically washes the granitic rocks, they become smooth, black, and as if coated with black-lead. The colouring matter does not penetrate the stone, which is coarse-grained granite, containing a few solitary crystals of hornblende. Considering the primitive formation of Atures

in the great, we perceive, that, like the granite of Syene in Egypt, it is a granite with hornblende, and not a real syenite formation. Many of the layers are entirely destitute of hornblende. The black crust is 0·3 of a line in thickness; it is found chiefly on the quartzose parts. The crystals of feldspar have sometimes preserved externally their reddish white colour, and rise above the black crust. On breaking the stone with a hammer, the inside is found to be in fact white, and without any trace of decomposition. These enormous stony masses appear sometimes in rhombs, sometimes under those hemispheric forms, which are peculiar to granitic rocks when they separate in blocks. They give the landscape a singularly gloomy aspect; their colour being in strong contrast with that of the foam of the river which covers them, and of the vegetation by which they are surrounded. The Indians say, that the rocks are "burnt, or carbonized by the rays of the sun." We saw them not only in the bed of the Oroonoko, but in some spots as far as five hundred toises from it's present shore, on heights which the waters now never reach even in their greatest swellings.

What is this brownish black crust, which gives these rocks, when they have a globular form, the appearance of meteoric stones? What idea can we form of the action of the water, which produces a deposit, or a change of colour

so extraordinary? We must observe in the first place, that this phenomenon does not belong to the cataracts of the Oroonoko alone, but is found in both hemispheres. At my return from Mexico in 1807, when I showed the granites of Atures and Maypures to Mr. Rozière, who had travelled over the valley of Egypt, the coasts of the Red Sea, and Mount Sinai, this learned geologist let me see, that the primitive rocks of the little cataracts of Syene display, like the rocks of the Oroonoko, a glossy surface, of a blackish gray, or almost leaden colour, and of which some of the fragments seem coated with tar. Recently, in the unfortunate expedition of Captain Tuckey, the English naturalists were struck with the same appearance in the *yellalas* (rapids and shoals) that obstructed the river Congo or Zaire. Dr. Kœnig has placed in the British Museum, by the side of the syenites of the Congo, the granites of Atures taken from a series of rocks, which were presented by Mr. Bonpland and myself to the illustrious president of the Royal Society of London. "These fragments," says Mr. Kœnig*, "alike resemble meteoric stones; in both rocks, those of the Oroonoko and of Africa, the black crust is composed, according to the analysis of Mr. Children, of the oxyd of iron and manganese." Some experiments

* *Voyage to the river Congo*, p. 488.

made at Mexico, conjointly with Mr. del Rio, had led me to think, that the rocks of Atures, which blacken the paper* in which they are wrapped, contain, beside oxyd of manganese, carbon, and supercarburetted iron. At the Oroonoko, granitic masses of forty or fifty feet thick are uniformly coated with these oxyds; and, however thin these crusts may appear, they must nevertheless contain pretty considerable quantities of iron and manganese, since they occupy a space of above a league square.

It must be observed, that all these phenomena of coloration have hitherto appeared in the torrid zone only, in rivers that have periodical overflowings, of which the habitual temperature is from twenty-four to twenty-eight centesimal degrees, and which flow, not over gritstone, or calcareous rocks, but over granite, gneiss, and hornblende rocks†. Quartz and feldspar scarcely contain five or six thousandths of oxyd of iron and of manganese; but in mica and hornblende these oxyds, and particularly that of iron, amount, according to Klaproth and

*. I remarked the same phenomenon from spongy grains of platina one or two lines in length, collected at the streamworks of Taddo, in the province of Choco. Wrapped up in white paper during a journey of several months, they had left a black stain, like that of plumbago or supercarburetted iron.

† *Hornblendegestein.*

Herrmann, to fifteen or twenty parts in a hundred. The hornblende contains also some carbon*, like the Lydian stone and *kieselschiefer*. Now if these black crusts were formed by a slow decomposition of the granitic rock, under the double influence of humidity and the tropical sun, how is it to be conceived, that these oxyds are spread so uniformly over the whole surface of the stony masses, and are not more abundant round a crystal of mica or hornblende, than on the feldspar and milky quartz? The ferruginous sand-stones, granites, and marbles, that become cinereous and sometimes brown in damp air, display an aspect altogether different. In reflecting upon the lustre and equal thickness of the crusts, we are rather inclined to think, that this matter is deposited by the Orooноko, and that the water has penetrated even into the clefts of the rocks. Adopting this hypothesis, it may be asked, whether the river hold the oxyds suspended like sand, and other earthy substances, or they be found in a state of chemical solution. The first supposition is less admissible, on account of the homogeneity of the crusts, which contain neither grains of sand, nor spangles of mica, mixed with the oxyds. We must then recur to the idea of a chemical solu-

* *Hoffmann und Breithaupt, Mineralogie*, 1815, Bz. Abth. 2, p. 120 and 151.

tion; and this idea is no way at variance with the phenomena, that we daily observe in our laboratories. The waters of great rivers contain carbonic acid; and, were they even entirely pure, they would still be capable, in very great volumes, of dissolving some portions of oxyd, or those metallic hydrats, which are regarded as the least soluble. The mud of the Nile, which is the sediment of the matters that the river holds suspended, is destitute of manganese; but contains, according to the analysis of Mr. Regnault, six parts in a hundred of oxyd of iron; and it's colour, at first black, changes to yellowish brown by desiccation and the contact of air*. The mud consequently is not the cause of the black crusts on the rocks of Syene. Mr. Berzelius had the goodness, at my request,

* The mud of the Nile contains,

Water	11
Carbon	9
Oxyd of iron	6
Silex	4
Carbonat of Magnesia	4
Carbonat of lime	18
Alumin	48
	100

(*Observations sur la Vallée d'Egypte, par M. Girard*, p. 64.)

I filtered at Atures the water of the Oroonoko; and it appeared to me, to contain nothing but quartzose sand, and many spangles of mica.

to examine these crusts, and recognized in them, as in those of the granites of the Oroonoko and Rio Congo, the union of iron and manganese. This celebrated chemist thinks, that the rivers do not take up these oxyds from the soil over which they flow, but derive them from their subterraneous sources, and deposit them on the rocks in the manner of cementation, by the action of particular affinities, perhaps by that of the potash of the feldspar. A long residence at the cataracts of the Oroonoko, the Nile, and the Rio Congo, and an examination of the circumstances that accompany this phenomenon of coloration, could alone lead to the complete solution of the problem we have discussed. Is this phenomenon independent of the nature of the rocks? I shall content myself with observing in general, that neither the granitic masses remote from the ancient bed of the Oroonoko, but exposed during the rainy season to the alternations of heat and moisture, nor the granitic rocks bathed by the brownish waters of the Rio Negro, assume the appearance of meteoric stones. The Indians say, "that the rocks are black only where the waters are white." They ought perhaps to add, "where the waters acquire great swiftness, and strike with force against the rocks of the banks." Cementation seems to explain why the crusts augment so little in thickness.

I know not whether it be an error, that in the missions of the Oroonoko the neighbourhood of bare rocks, and especially of the masses that have crusts of carbon, oxyd of iron, and manganese, are considered as injurious to health. In the torrid zone still more than in others, the people multiply pathogenic causes at will. They are afraid to sleep in the open air, if forced to expose the face to the rays of the full moon. They also think it is dangerous, to sleep on granite near the river; and many examples are cited of persons, who, after having passed the night on these black and naked rocks, have awakened in the morning with a strong paroxysm of fever. Without entirely lending faith to this assertion of the missionaries and natives, we generally avoided the *laxas negras*, and stretched ourselves on the beach covered with white sand, when we found no tree from which to suspend our hammocks. At Carichana, the village is intended to be destroyed, and it's place changed, merely to remove it from the *black rocks*, from ground where for a space of more than 10,000 square toises, banks of bare granite form the surface. From similar motives, which must appear very chimerical to the naturalists of Europe, the Jesuits Olmo, Forneri, and Mellis, removed a village of Jaruroes to three different spots, between the Raudal of Tabaje and the Rio Anaveni. I have thought it proper to re-

late these facts, as they came to my knowledge, because we are almost wholly ignorant what the gaseous mixtures are, that cause the insalubrity of the atmosphere. Can it be admitted, that, under the influence of excessive heat, and of constant humidity, the black crusts of the granitic rocks are capable of acting upon the ambient air, and producing miasmata with a triple basis of carbon, azot, and hydrogen? Of this I doubt. The granites of the Oroonoko, it is true, often contain hornblende; and those who are accustomed to practical labour in the mines are not ignorant, that the most noxious exhalations rise from galleries wrought in syenitic * and hornblende rocks: but in an atmosphere renewed every instant by the action of little currents of air, the effect cannot be the same as in a mine.

It is probably dangerous to sleep on the *laxas negras*, only because these rocks retain a very elevated temperature during the night. I have found their temperature in the day at 48°, the air in the shade being at 29·7°; during the night the thermometer on the rock indicated 36°, the air being at 26°. When the accumulation of heat in the stony masses has reached a stationary degree, these masses become at the same hours nearly of the same temperature. What they

* For instance at Scharfenberg, near Misnia, in Saxony. See *Lampadius, Samml. pract. chem. Abhandl. B 3. p.* 181.

have acquired more in the day they lose at night by radiation, the force of which depends on the state of the surface of the radiating body, the interior arrangement of it's particles, and above all on the clearness of the sky, that is on the transparency of the atmosphere and the absence of clouds. When the declination of the sun varies very little, this *luminary* adds daily the same quantities nearly of heat, and the rocks are not hotter at the end than in the middle of summer. There is a certain *maximum*, which they cannot pass, because they do not change the state of their surface, their density, or their *capacity* for caloric. On the shores of the Orooonoko, when you get out of your hammock during the night, and touch with your bare feet the rocky surface of the ground, you are singularly struck by the sensation of heat, which you experience. I observed pretty constantly, in putting the bulb of the thermometer in contact with the ledges of bare rocks, that the *laxas negras* are hotter during the day than the reddish-white granites at a distance from the river; but the latter cool during the night less rapidly than the former. It may be easily conceived, that the emission and loss of caloric is more rapid in masses with black crusts, than in those which abound in laminæ of silvery mica. When you walk, between the hours of 1 and 3 in the afternoon, at Carichana, Atures, or Maypures, among

those blocks of stone destitute of vegetable mould, and piled up to great heights, you are suffocated as if you were placed before the opening of a furnace. The winds, if they be ever felt in those woody regions, far from bringing coolness, appear more heated when they have passed over beds of stone, and heaps of rounded blocks of granite. This augmentation of heat adds to the insalubrity of the climate.

Among the causes of the depopulation of the Raudales, I have not reckoned the small-pox, that malady, which in other parts of America makes such cruel ravages, that the natives, seized with dismay, burn their huts, kill their children, and renounce every kind of society *. This scourge is almost unknown on the banks of the Oroonoko, and should it penetrate to them, it may be hoped, that it's effects would be immediately countervailed by vaccination, the blessings of which are daily felt along the coasts of Terra Firma. What depopulates the Christian settlements is the repugnance of the Indians for the regulations of the missions, the insalubrity of a climate at once hot and damp, bad nourishment, want of care in the diseases of children, and the guilty practice of mothers of preventing pregnancy by the use of deleterious herbs.

* As the Mahas in the plains of the Missoury, according to the accounts of the American travellers, Clark and Lewis.

Among the barbarous people of Guyana, as well as those of the half-civilized islands of the South sea, young wives will not become mothers. If they have children, their offspring are exposed not only to the dangers of savage life, but also to other dangers arising from the strangest popular prejudices. When twins are born, false notions of propriety and family honor require, that one of them should be destroyed. "To bring twins into the world, is to be exposed to public scorn; it is to resemble rats, opossums, and the vilest animals, which bring forth a great number of young at a time." Nay, more: "two children born at the same time cannot belong to the same father." This is an axiom of physiology of the Salivas; and in every zone, and in different states of society, when the vulgar seize upon an axiom, they adhere to it with more stedfastness than the better informed men, by whom it was first hazarded. To avoid a disturbance of conjugal tranquillity, the old female relations of the mother, or the *mure japoic-nei* (midwives), take care, that one of the twins shall disappear. If the new-born infant, though not a twin, have any physical deformity, the father instantly puts it to death. They will have only robust and well-made children, for deformities indicate some influence of the evil spirit Ioloquiamo, or the bird *Tikitiki*, the enemy of the human race. Sometimes children of a feeble

constitution undergo the same fate. When the father is asked what is become of one of his sons, he will pretend, that he has lost him by a natural death. He will disavow an action, that appears to him blamable, but not criminal. "The poor *mure* *," he will tell you, "could not follow us; we must have waited for him every moment; he has not been seen again, he did not come to sleep where we passed the night." Such is the candor and simplicity of manners, such the boasted happiness of man in the *state of nature!* He kills his son, to escape the ridicule of having twins, or to avoid journeying more slowly; in fact, to avoid a little inconvenience.

These acts of cruelty, I confess, are less frequent, than they are believed to be; yet they occur even in the missions, during the time when the Indians leave the village, to retire to the *conucos* of the neighbouring forests. It would be erroneous, to attribute these actions to the state of polygamy, in which the uncatechized Indians live. Polygamy no doubt diminishes the domestic happiness and internal union of families; but this practice, sanctioned by Ismaelism, does not prevent the people of the east from loving their children with tenderness. Among the Indians of the Oroonoko, the father returns home only to eat, or to sleep in his ham-

* In Tamanack *mure* signifies a child; *emuru*, a son.

mock; he lavishes no caresses on his infants, or on his wives, whose office it is to serve him. Parental affection begins to display itself only when the son has become strong enough, to take a part in hunting, fishing, and the agricultural labours of the plantations.

If the pernicious practice of taking drinks that cause abortion diminish the number of births, these drinks do not destroy health sufficiently, to prevent young women from becoming mothers at a more advanced age. This phenomenon, very remarkable in a physiological view, has long since struck the missionary monks. The Jesuit Gili, the confessor during fifteen years of the Indians of the Oroonoko, who boasts of knowing *i segreti delle donne maritate*, expresses himself upon this point with singular simplicity. "In Europe," says he, "married women are afraid of having children, because they know not how to feed, clothe, and provide for them. All these apprehensions are unknown to the women of the Oroonoko. They choose the time when they will become mothers from two systems diametrically opposite, and according to the ideas which they have formed of the means of preserving their freshness and beauty. Some say, and this is the most general opinion, that it is best to begin late to bear children, that they may be able in the first years of their marriage to devote themselves undisturbed to do-

mestic and agricultural labours. Others believe on the contrary, that they shall fortify their health, and attain a happier old age, by becoming mothers when very young. According as the Indians adopt the one or the other of these systems, the abortive medicaments are administered at different periods." In reflecting on these selfish calculations among savages, we think we may congratulate the civilized nations of Europe, that they have hitherto had no knowledge of *ecbolics* in appearance so little injurious to health. The introduction of these drinks would perhaps increase the depravity of manners in towns, where one quarter of the children see the light only to be abandoned by their parents. The new abortives however might possibly occasion the same danger in our climates, as the use of savine, aloes, and the essential oils of cinnamon and cloves. The robust constitution of the savage, in whom the different systems are more independent of each other, resists better and for a longer time an excess of stimulants, and the use of deleterious agents, than the feeble constitution of civilized man. I thought it necessary to enter into these pathological details, far from agreeable as they are, because they make known a part of the causes, which in the rudest state of our species, as well as in a high degree of civilization, render the progress of population almost imperceptible.

Other causes are united with those which I have just pointed out. It has been observed in the college of the missions of Piritu, established at Nueva-Barcelona, that on comparing the Indian villages situate on the banks of rivers, with those which have been constructed in very dry places, the balance of births is found constantly in favour of the latter. The custom of the Indian women of bathing several times a day before the sun rises, and after it sets, at the moment when the air is coldest, appears to enfeeble their constitutions *.

* The population increases with extraordinary rapidity in the ancient missions of Piritu at a distance from the Oroonoko. It will be gratifying to see the results, which I shall cite in this note, from MS. registers for the year 1799 in my possession. I select the most considerable villages.

NAMES OF THE MISSIONS.	Total population.	Births.	Proportion of births to the total population.	Deaths.	Proportion of deaths to the total population.
La Pur. Concepcion de Piritu -	1285	120	1-10th	64	1-20th
Nuestra Segnora del Pilar - - -	2119	204	1-10th	108	1-19th
San Antonio de Clarines - - -	1656	115	1-14th	93	1-18th
San Jose de Caigua -	1843	118	1-16th	50	1-36th
San Pablo Apostolo de Huere - -	948	101	1-9th	68	1-13th
Santa Rosa de Ocopi	1089	104	1-10th	47	1-23d

The Padre-guardian of the Observantins, alarmed at the rapid depopulation of two villages situate near the cataracts, had some years before proposed to the governor of the province, who resides at Angostura, to supply the loss of Indians by Negroes. It is well known, that the African race wonderfully resists hot and damp climates. A colony of free Negroes has prospered completely on the unhealthy banks of the Caura, in the mission of San Luis Guaraguaraico, where they obtain the richest harvests of maize. The Padre-guardian wished to remove a part of these black planters to the cataracts of the Oroonoko, or purchase slaves in the West

The proportions present great differences, because they are taken from one year only. Since, according to the calculation of probabilities, the accuracy of the result increases as the total sum of the population is more considerable, I shall add, that 38 villages gave me, on a total population of 24,778 souls, 1934 births, and 961 deaths. The proportions of the births and deaths to the total population therefore were 12 to 1 and 25 to 1. In France these proportions are 28 to 1 and 30 to 1. Thus the 38 villages of the missions of Piritu had increased in one year 4 per cent, or 1-24th of the population; while near the Oroonoko the increase was not 1 and 1-5th per cent, or 1-85th of the population. It is almost superfluous to add, that the great difference of these results must be attributed to physical and moral causes, extremely complicated. It appeared to me in general, that the population in the missions of Piritu, near the coast, increases in 10 years 30 per cent. In Great Britain this increase was found from 1801 to 1811 to be 14 per cent; in the United States of America, 36 per cent.

India Islands, uniting with them the fugitive negroes of Essequibo, as had been done at Rio Caura. It is probable, that this scheme would have produced happy effects. It reminds us on a small scale of the establishment at Sierra Leone; and, in affording a prospect of meliorating the condition of the blacks, it seemed to lead back Christianity to it's primitive purpose, that of favouring the happiness and liberty of the lowest classes of the people. A mistaken pity destroyed this project. The governor replied to the monks, "that, since they could not assure the life of the Negroes, any more than that of the Indians, it was not just to compel the former to inhabit the villages of the cataracts." The preservation of these missions now depends in some measure on two families of Guahiboes and of Macoes, who alone show some traces of civilization, and love a sedentary life. Should these families become extinct, the other Indians, already impatient under the system of the missions, will abandon father Zea; and, at a spot which may be regarded as the key of the Oroonoko, travellers will find no succour, and no pilot, who can pass the boats through the rapids. The communication between the little fort of the Rio Negro and the capital of Angostura, if not interrupted, at least will be rendered very difficult. It requires an intimate knowledge of the local situation, to venture amid the labyrinth of

shoals and little rocks, that obstruct the bed of the river near Atures and Maypures.

While our boat was unloading, we examined closely, wherever the shore could be approached, the terrific spectacle of a great river narrowed and reduced as it were to foam. I shall endeavour to paint, not the sensations we felt, but the aspect of a spot so celebrated among the scenes of the new world. The more imposing and majestic the objects we describe, the more essential it becomes, to seize them in their smallest details, to fix the outline of the picture we would present to the imagination of the reader, and to describe with simplicity what characterizes the great and imperishable monuments of nature.

The navigation of the Oroonoko from it's mouth as far as the confluence of the Anaveni, an extent of 260 leagues, is not impeded. There are shoals and eddies near Muitaco, in a cove that bears the name of the *Mouth of Hell* *; and there are rapids † (*Raudelitos*) near Carichana and San Borja: but in all these places the river is never entirely barred, as a channel is left by which boats can pass up and down.

In all this navigation of the Lower Oroonoko, travellers experience no other danger than that of the natural rafts formed by trees, which are

* *Boca del Infierno.*

† The three raudales of Marimara, Cariven, and Tabaje, which we have described in vol. iv, p. 543, 561, and 569.

uprooted by the river, and swept along in it's great floods. Wo to the canoes, that during the night strike against these rafts of wood interwoven with lianas! Covered with aquatic plants, they resemble here, as in the Mississipi, floating meadows, the *chinampas* * of the Mexican lakes. The Indians, when they wish to surprise a tribe of their enemies, bring together several canoes, fasten them to each other with cords, and cover them with grass and branches, to imitate this assemblage of trunks of trees, which the Oroonoko sweeps along in it's *thalweg*, or middle current. The Caribs are accused of having heretofore excelled in the use of this artifice; at present the Spanish smugglers in the neighbourhood of Angostura have recourse to the same expedient, to escape the vigilance of the custom-house officers.

After having gone up the Oroonoko beyond the Rio Anaveni, we find, between the mountains of Uniana and Sipapu †, the Great Cataracts of Mapara and Quittuna, or, as they are more commonly called by the missionaries, the Raudales of Atures and Maypures. These bars, which extend from one bank to the other, present in general a similar aspect; they are composed of innumerable islands, dikes of rock,

* Floating gardens.

† According to the Indian pronunciation "*Tipapu*."

and blocks of granite piled on one another and covered with palm-trees, among which one of the greatest rivers of the New World chafes in foam. But notwithstanding a uniformity of aspect, each of these cataracts preserves an individual character. The first, or northernmost, is most easily passable when the waters are low. The Indians prefer crossing the second, the Maypures, at the time of great floods. Beyond the Maypures and the mouth of the Canno Cameji, the Oroonoko is again free from obstacles for the length of more than 167 leagues, or nearly to it's source; that is to say, as far as the *Raudalito* of Guaharibos, east of Canno Chiguire and the lofty mountains of Yumariquin.

Having visited the basins of the two rivers Oroonoko and Amazon, I was singularly struck by the differences they display in their course of unequal extent. The falls of the Amazon, which is nearly 980 nautical leagues * (20 to a degree)

* Reckoning the sinuosities, as for the Oroonoko, at one third of the course of the river in a straight line, according to the custom of hydrographers, M. de la Condamine gives the Amazon 1100, and the Ucayale 500 leagues in length. (*Voyage à l' Equateur*, p. 189.) I find for the Ucayale, on rectifying the longitude of the sources of the Apurimac, 360 leagues. All the statements given in geographical works respecting relative lengths of the course of rivers are extremely inaccurate, because the estimations of old maps are repeated, and because the sinuosities (the space which a boat carried along

in length, are pretty near it's source, in the first sixth of it's total length; and five sixths of it's course are entirely free. We find the great falls of the Oroonoko on a point far more unfavourable to navigation; if not at the half, at least much beyond the first third of it's length. In both rivers it is neither the mountains, nor the different stages of flat lands lying over one another, whence they take their origin, that cause the cataracts; they are produced by other mountains, other stages [*biefs*], which, after a long and tranquil course, the rivers have to pass over, precipitating themselves from step to step.

The Amazon does not pierce it's way through the principal chain of the Andes, as was affirmed at a period when it was gratuitously supposed, that, wherever mountains are divided into parallel chains, the intermedial or central ridge must be more elevated than the others. This great river rises (and it is a point of some importance to geology) to the east of the western chain; which alone in this latitude merits the denomination of the high chain of the Andes. It is formed by the junction of the river Aguamiros with the Rio Chavinillo, which issues from the lake Llauricocha, in a longitudinal valley bounded by the western and the inter-

by the mid stream would traverse) are calculated according to methods altogether different.

medial chain of the Andes. In order to form an accurate idea of these hydrographical relations it must be recollected, that a division into three chains takes place in the colossal groupe or *knot* of the mountains of Pasco and Huanuco. The western chain, which is the loftiest, and takes the name of the *Cordillera real de Nieve*, directs it's course (between Huary and Caxatambo, Guamachuco and Luema, Micuipamba and Guangamarca *) by the *Nevados* of Viuda, Pelagatos, Moyopata, and Huaylillas, and by the *Paramos* of Guamani and Guaringa, toward the town of Loxa. The intermedial chain separates the waters of the Upper-Maragnon from those of the Guallaga, and during a long time reaches but the small elevation of a thousand toises ; it enters the region of perpetual snows only to the south of Huanuco in the Cordillera of Sasaguanca. It stretches at first toward the north, by Huacrachuco, Chachapoyas, Moyobamba, and the *Paramo* of Piscoguannuna; and then progressively lowers toward Peca, Copallin, and the mission of San Yago, at the eastern extremity of the province of Jaen de Bracamoros. The third, or easternmost chain, skirts the right bank of the Rio Guallaga, and loses itself in the

* In the *Partidos* or provinces of Conchucos, Guamachuco, and Caxamarca, belonging to the intendancias of Tarma and Truxillo.

latitude of 7°. As long as the Amazon flows from south to north in the longitudinal valley, between two chains of unequal height, (that is, from the farms of Quivilla and Guancaybamba, where the river is crossed on wooden bridges, as far as the confluence of the Rio Chinchipe,) there are neither bars, nor any obstacle whatever to the navigation of boats. The falls of water begin only where the Amazon turns toward the east, crossing the intermedial chain of the Andes, which widens considerably toward the north. It meets with the first rocks of red sand-stone, or of ancient conglomerate, between Tambillo and the *Pongo* of Rentema, near which I measured the breadth, depth, and swiftness of the waters; and leaves the rocks of red sand-stone east of the famous strait of Manseriche, near the *Pongo* of Tayuchuc, where the hills rise no higher than 40 or 50 toises above the level of the Amazon *. The river does not

* The facts which I here relate respecting the Upper Maragnon, and the direction of the intermedial chain of the Andes, which is connected with the principal chain by the mountains of Zamora, and the Paramo of Assuay, differ from what M. de la Condamine published in his works, and in memoirs, in other respects very valuable. They are founded on notions, which I had an opportunity of acquiring, during my stay at Loxa, in the kingdom of Quito, at Tomependa, on the borders of the Amazon, and in Peru, at Micuipampa, at Caxamarca, and at Truxillo. It is sufficient to mention here, that from Chili to the kingdom of New Granada, the Cor-

reach the easternmost chain, which bounds the Pampas del Sacramento. From the hills of Tayuchuc as far as Grand Para, during a course of more than 750 leagues, the navigation is free from obstacles. It results from this rapid sketch, that, if the Maragnon had not to pass over the hilly country between San Yago and Tomependa, which belongs to the central chain of the Andes, it would be navigable from it's mouth as far as Pumpo, near Piscobamba, in the province of Conchucos, 43 leagues north of it's source.

We have just seen, that in the Oroonoko, as in the Amazon, it is not near the origin of the rivers, that the great cataracts are found. After a tranquil course of more than 160 leagues, from the little Raudal of Guaharibos, east of Esmeralda, as far as the mountains of Sipapu, the river, augmented by the waters of the Jao, the Ventuari, the Atabapo, and the Guaviare, suddenly changes it's primitive situation from east to west, and runs from south to north ; and, in crossing the *land strait* * in the plains of Meta,

dilleras furnish five *knots of mountains,* those of Porco, Cusco, Pasco, Assuay, and los Pastos. The knots are formed by the union of several chains, and the structure or frame of the Andes is disclosed to us by an accurate knowledge of these knots, as I shall demonstrate in a separate chapter.

* This strait, which we have several times mentioned, is formed by the Cordilleras of the Andes of New Grenada, and the Cordillera of Parima. (See vol. iv, page 311 and 468.)

meets the advanced buttresses of the Cordillera of Parima. This obstacle is the cause of cataracts far more considerable, and more injurious to the navigation, than all the *Pongos* of the Upper Maragnon, since, as we have shown above, they are proportionally nearer to the mouth of the river. I have entered into these geographical details, to prove by the example of the two greatest rivers of * the New World, 1st, that it cannot be ascertained in an absolute manner, that, beyond a certain number of toises, a certain height above the level of the sea, rivers are not navigable; 2dly, that the rapids are not always occasioned, as several treatises of general topography affirm, by the height of the first obstacles, by the first lines of ridges, which the waters have to surmount near their sources.

The northernmost of the great cataracts of the Oroonoko is the only one bounded on each side by lofty mountains. The left bank of the river is generally lower, but makes part of a plane, which rises again west of Atures, toward the Peak of Uniana, a pyramid nearly three thousand feet high, and placed on a wall of rock with steep slopes. The situation of this solitary peak in the plain contributes to render it's aspect more imposing and majestic. Near the mission,

* We may add the instances of the Ohio and Dnieper.

in the country which surrounds the cataract, the aspect of the landscape varies at every step. We find united in a small space all that is most rude and gloomy in nature, with an open country, and lovely pastoral scenery. In the physical, as in the moral world, the contrast of effects, the comparison of what is powerful and menacing with what is soft and peaceful, becomes a faithful source of our pleasures and our emotions.

I shall here repeat some scattered features of a picture, which I traced in another work, a short time after my return to Europe *. The savannahs of Atures, covered with slender plants and grasses †, are real meadows resembling those of Europe; they are never inundated by the rivers, and seem to wait to be ploughed by the hand of man. Notwithstanding their extent, they do not display the monotony of our plains; they surround groups of rocks, and blocks of granite piled on one another. On the very borders of these plains and this open country you find glens scarcely lighted by the rays of the setting sun, and gullies where the humid

* *Ansichten der Natur.*, P. I, p. 170.

† Panicum *rottboelloides*, p. *monostachyum*, p. *glutinosum*, p. *aturense*, oplismenus Burmanni (common to America and the East Indies), thrasia *paspaloides*, chœtospora *pterocarpa*, juncus *platycaulos*, aristida *spadicea*, polypogon *interruptus*, cyperus *cuspidatus*, c. *sesleroides*, isolepis *lanata*, i. *dichotoma*.

soil, loaded with arums, heliconias, and lianas, manifests at every step the wild fecundity of nature. Every where just rising above the earth appear those shelves of granite completely bare, that I described at Carichana, and which I have seen no where in the ancient world of such prodigious breadth as in the valley of the Oroonoko. Where springs gush from the bosom of these rocks, verrucarias, psoras, and lichens are fixed on the decomposed granite, and have there accumulated mould. Little euphorbias, peperomias, and other succulent plants, have taken the place of the cryptogamous tribes; and evergreen shrubs, rhexias, and purple flowered melastomas, form verdant isles amid desert and rocky plains. We are never wearied of repeating, that the distribution of these spots, the clusters of small trees with coriaceous and shining leaves scattered in the savannahs, the limpid rills that dig themselves a channel across the rocks, and wind alternately through fertile places and over bare shelves of granite, every thing here recalls to mind what our gardens and plantations contain most picturesque and lovely. We seem to recognize the industry of man, and the traces of cultivation, amid the wildness of the scenery.

But it is not the disposition of the ground that immediately skirts the mission of Atures, which alone gives the landscape so remarkable

a physiognomy ; the lofty mountains, that bound the horizon on every side, contribute to it also by their form, and the nature of their vegetation. These mountains are in general but seven or eight hundred feet in height above the surrounding plains. Their summit is rounded, as for the most part in granitic mountains, and covered with a thick forest of the laurel-tribe. Clusters of palm-trees*, the leaves of which, curled like feathers, rise majestically at an angle of seventy degrees, are dispersed amid trees with horizontal branches ; and their bare trunks, like columns of a hundred, or a hundred and twenty feet high, shoot up into the air, and appearing distinctly against the azure vault of the sky, " resemble a forest planted upon another forest." When, as the moon was going down behind the mountains of Uniana, her reddish disk was hidden behind the pinnated foliage of the palm trees, and again appeared in the aërial zone, that separates the two forests, I thought myself transported for a few moments to the hermitage of the old man, which Mr. Bernardin de Saint-Pierre has described as one of the most delicious scenes of the Isle of Bourbon, and I felt how much the mien of the plants and their groupings resembled each other in the two worlds. In describing a small spot of land

* *El cucurito.*

in an island of the Indian Ocean, the inimitable author of Paul and Virginia has sketched the vast picture of the landscape of the tropics. He knew how to paint nature, not because he had studied it scientifically, but because he felt it in all it's harmonious analogies of forms, colours, and interior powers.

East of the Atures, near these rounded mountains crowned by two superimposed forests of the laurels and palms, other mountains rise of a very different aspect. Their ridge is bristled with pointed rocks, that rise like pillars above the summits of the trees and shrubs. These effects are common to all granitic table-lands, at the Harz, in the metalliferous mountains of Bohemia, in Gallicia, on the limit of the two Castiles*, or wherever a granite of new formation appears above the ground. The rocks, placed at distances from each other, are composed of blocks piled together, or divided into regular and horizontal beds. When they are situate near the Oroonoko, the flamingoes, *soldadoes*†, and other fishing birds, perch on their summits, and appear like men posted as sentinels. The resemblance is sometimes so great, that, as several ocular witnesses tell us, the inhabitants of Angostura, soon after the founda-

* From four hundred to six hundred toises above the level of the ocean.

† A large species of heron.

tion of their city, were one day alarmed by the sudden appearance of herons, *soldadoes*, and *garzas*, on a mountain toward the south. They believed they were menaced with an attack of *Indios monteros* (Indian savages); and, notwithstanding the opinion of some persons accustomed to this land of illusion, the people were not perfectly tranquillized, till they saw the birds soaring in the air, and continuing their migration toward the mouths of the Oroonoko.

The fine vegetation of the mountains is spread over the plains*, wherever the rock is covered with mould. We generally find, that this black mould, mixed with fibrous vegetable matter, is separated from the granitic rock by a layer of white sand. The missionary assured us, that a verdure of perpetual freshness prevails in the vicinity of the cataracts, produced by the quantity of vapour, which the river, broken into torrents and cascades for the length of

* Near Atures we found the sipania *glomerata*, s. *dichotoma*, utricularia *fimbriata*, matuschskea *hispida*, coutoubea *minor*, solanum platyphyllum, schwenkia *americana*, *platycarpum orinocense* (a fine tree, figured by Mr. Bonpland in the first volume of our *Plantes equinoxiales*), convolvulus *aturensis*, podostemum *rupioides*, abolboda *pulchella*, phyllanthus *piscatorum*, myrtus *phylliroides*, many plumerias, melastomas, cupheas, jussiæas; &c. It is asserted, that father Olmo discovered, in 1747, near Atures, in the country of the Piraoas, the *uarimacu*, or wild cinnamon tree, which is unquestionably the laurus cinnamomoides of Mutis.

three or four thousand toises, diffuses in the air.

We had scarcely heard the thunder roll once or twice at Atures, and the vegetation already every where displayed that vigorous aspect, that brilliancy of colour, which are found on the coast only at the end of the rainy season. The old trees were decorated with beautiful orchideas*, yellow bannisterias, blue flowered bignonias, peperomias, arums, and pothoses. A single trunk displays a greater variety of vegetable forms, than an extensive space of ground contains in our countries. Close to the parasite plants peculiar to burning climates we observed, not without surprise, in the centre of the torrid zone, and near the level of the sea†, mosses resembling in every thing those of Europe. We gathered near the Great Cataracts of Atures that fine species of grimmia‡ with fontinalis leaves, which has so much fixed the attention of botanists. It is suspended to the

* Cymbidium *violaceum*, habenaria *angustifolia*, &c.

† See vol. iii, p. 75.

‡ Grimmia *fontinaloides*. See Hooker, *Musci Exotici Humboldtiana*, 1818, tab. ii. The learned author of the Monography of the Jungermanias, Mr. Jackson Hooker, has had the goodness to take upon himself with noble disinterestedness, to publish at his own expense, at London, the whole collection of cryptogamous plants, which were brought by Mr. Bonpland and myself from the equinoctial regions of America.

branches of the loftiest trees. Of the phænerogamous plants, the families that prevail in the woody spots are the mimosas, ficuses, and the laurineas*. This fact is the more characteristic, as, according to the recent observation of Mr. Brown, the laurineæ appear to be almost entirely wanting on the opposite continent in the equinoctial part of Africa. Plants that love humidity adorn the scenery surrounding the cataract. We there find in the plains groups of heliconias and other scitamineæ with large and glossy leaves, bambusas, and the three palm trees, the *murichi*, *jagua*, and *vadgiai*, each of which forms separate groups. The *murichi*, or mauritia with scaly fruits, is the celebrated sago-tree of the Guaraon Indians; it is a real social plant†. It has palmate leaves, and has no relation to the palm trees with pinnate and curled leaves; to the *jagua*, which appears to be a species of the cocoa tree; or to the *vadgiai* ‡ or

* The laurineas of the low and hot region of Equinoctial America are ocoteas, (as for example, between Carichana and San Fernando de Atabapo, ocotea *lineata*, ocotea *cymbarum*, ocotea *javitonsis*). Other laurineas (the perseas, and the litseas) appear to belong to the subalpine and temperate region, which rises to more than from five hundred to eight hundred toises above the level of the ocean. See our *Nov. Genera et Species*, vol. ii, p. 157 and 169.

† See vol. iv, p. 334; and vol. iii, p. 278.

‡ Or *vadschiai* in the Parequa language. See our *Nov. Genera et Species Plant.*, vol. i, p. 315.

cucurito, which may be assimilated to the fine species oreodoxa. The cucurito, which is the palm most prevalent around the cataracts of the Atures and Maypures, is remarkable for it's stateliness. It's leaves, or rather it's palms, crown a trunk of eighty or one hundred feet high; their direction is almost perpendicular when young, as well as at their full growth, the points only being incurvated. They are real plumes of the most soft and verdant green. The *cucurito*, the *pirijao*, the fruit of which resembles the apricot, the oreodoxa regia or *palma real* of the island of Cuba, and the ceroxylon of the high Andes, display the most majestic forms, that we saw among the palm trees of the new world. As we advance toward the temperate zone, the plants of this family decrease in size and beauty. What a difference between the species we have just mentioned, and the date tree of the East, which is become to the landscape painters of Europe, unfortunately, the type of a group of palm-trees!

We must not be surprised that persons, who have travelled only in the north of Africa, in Sicily, or in Murcia, cannot conceive, that of all the forms of large trees, that of the palm is the most grand and beautiful. Incomplete analogies prevent Europeans from having a just idea of the aspect of the torrid zone. All the world knows, for instance, that this zone is em-

bellished by the contrasts displayed in the foliage of the trees, and particularly by the great number of those with *pinnate leaves**. The ash, the service-tree, the inga, the acacia of the United States, the gleditsia, the tamarind, the mimosas, the desmanthus, have all pinnate leaves, with foliolæ more or less long, slender, tough, and shining. But can a group of ashes, service-trees, or sumach, recall to our imagination the picturesque effect produced by the shade of tamarinds or mimosas, when the azure of the sky appears through their small, slender, and delicately pinnated leaves? These considerations are more important, than they may at first seem. The forms of plants determine the physiognomy of nature; and this physiognomy influences the moral dispositions of nations. Every type comprehends species, which, while of the same appearance in their general mien, differ in the varied developement of the similar organs. The palm-trees, the scitamineæ, the malvaceæ, the trees with pinnate leaves, do not all display the same picturesque beauties; and generally the most beautiful species of each type, in plants as in animals, belong to the equinoctial zone.

* *Foliis pinnatis.* All the forms, from the fraxinus to the desmanthus, have been arranged in order, according as the foliolæ become smaller.

The proteaceæ*, crotons, agaves, and the great tribe of the cactuses, which inhabit exclusively the New World, disappear gradually, as you ascend the Oroonoko above the mouths of the Apure and the Meta. It is rather the shade and humidity, however, than the distance from the coast, which oppose the migration of the cactuses toward the south. We found real forests of them mingled with crotons, covering a great space of arid land to the east of the Andes, in the province of Bracamoros, toward the Upper Maragnon. The arborescent ferns seem to fail entirely near the cataracts of the Oroonoko; we found no species as far as San Fernando de Atabapo, that is, to the confluence of the Oroonoko and the Guaviare.

Having now examined the vicinity of the Atures, it remains for me to speak of the rapids themselves, which are found in a part of the valley, where the bed of the river, deeply ingulfed, has almost inaccessible banks. It was only in a very few spots, that we could enter into the Oroonoko to bathe between two cataracts, in coves, where the waters have eddies of little velocity. Persons who have dwelt in the Alps, the Pyrenees, or even the Cordilleras, so celebrated for the fractures and the vestiges of

* *Rhopalas*, which characterise the vegetation of the Llanos.

destruction, which they display at every step, can scarcely figure to themselves from a simple narration the state of the bed of the river. It is traversed, in an extent of more than five miles, by innumerable dikes of rock, that form so many natural dams, so many barriers resembling those of the Dnieper, which the ancients* designated by the name of *phragmoi.* The space between the rocky dikes of the Oroonoko is filled with islands of different dimensions; some hilly, divided into several paps, and two or three hundred toises in length, others small, low, and like simple shoals. These islands divide the river into a number of torrents, that boil up as they break against the rocks; they are all furnished with *jaguas* and *cucuritoes* with plumy leaves; and seem a mass of palm-trees rising amid the foamy surface of the waters. The Indians, to whom the boats are entrusted, to be passed empty across the *raudales,* distinguish every shelf, and every rock, by a particular name. On entering from the south you find first the Leap of the Toucan, *Salto del Piapoco;* and between the islands of Avaguri and Javariveni

* *Constant. Porphyrog. de Administrando Imperio,* ch. 52. It has been found possible, to render the rapids of the Dnieper navigable from the village of Staroi-Kaidak, as far as the mouth of the Ossiborowka. See Julius Klaproth, in the Magazin Encyclopédique, 1817, September, p. 139.

is the *Raudal of Javariveni*, where, on our return from Rio Negro, we passed some hours amid the rapids, waiting for our boat. A great part of the river appeared dry. Blocks of granite are heaped together, as in the *morraines*, which the glaciers of Switzerland drive before them. The river is every where ingulfed in caverns; and in one of these caverns we heard the water roll at once over our heads and beneath our feet. The Oroonoko seems divided into a multitude of arms or torrents, each of which seeks to force a passage through the rocks. We were struck with the little water to be seen in the bed of the river, the frequency of subterraneous falls, and the tumult of the waters breaking on the rocks in foam.

> Cuncta fremunt undis; ac multo murmure montis
> Spumeus invictis canescit fluctibus amnis*.

Having passed the *Raudal of Javariveni* (I only name here the principal falls) we come to the *Raudal of Canucari*, formed by a ledge of rocks, that unites the islands of Surupamana and Uirapuri. When the dikes, or natural dams, are only two or three feet high, the Indians venture to descend them in boats. In going up the river, they swim on before, and, after many

* Pharsal., lib. x, v. 132.

vain efforts, succeed in fixing a rope to one of the points of rock that crown the dike, and then, by means of this rope, draw the bark to the top of the raudal. The bark, during this arduous task, often fills with water; at other times it is stove against the rocks, and the Indians, their bodies bruised and bleeding, extricate themselves with difficulty from the whirlpools, and reach, by swimming, the nearest island. When the steps or rocky barriers are very high, and entirely bar the river, light boats are carried on shore, and with the help of branches of trees placed under them to serve as rollers, they are drawn* as far as the place where the river again becomes navigable. This operation is seldom necessary when the water is high. We cannot speak of the cataracts of the Oroonoko, without recalling to mind the manner heretofore employed for descending the cataracts of the Nile, of which Seneca† has left us a description probably more poetical than accurate. I shall only cite the passage, which traces with fidelity what may be seen every day at Atures, Maypures, and in some *Pongoes* of the Amazon. "Two men embark in a small boat, one steers, and the other empties it as it fills with water. Long

* *Arastrando la piragua.* From this word *arastrar*, to draw on the ground, is derived the Spanish term *arastradero*, a portage, as it is called in North America.

† *Nat. Quæst.*, lib. 4, cap. 2. (Edit. Elzev., tom. ii, p. 609.)

buffeted by the rapids, the whirlpools, and contrary currents, they pass through the narrowest channels, avoid the shoals, and rush down with the whole river, guiding the course of the boat in it's accelerated fall."

In hydrographic descriptions of countries, the vague names of *cataracts, cascades, falls,* and *rapids* (*saltos, chorros, pongos, cachoeiras,* and *raudales,*) which denote those tumultuous movements of water, which arise from very different circumstances of the ground, are generally confounded with one another. Sometimes a whole river precipitating itself from a great height, and by one single fall, renders the navigation impossible. Such is the majestic fall of the Rio Tequendama, which I have represented in my *Views of the Cordilleras ;* such are the falls of the Niagara, and the Rhine, much less remarkable for their elevation, than for the mass of water they contain. Sometimes stony dikes of small height succeed each other at great distances, and form distinct falls; such are the *cachoeiras* of the Rio Negro, and the Rio Madeira, the *saltos* of the Rio Cauca, and the greater part of the *pongos,* that are found in the Upper Maragnon, from the confluence of the Chinchipe to the village of San Borja. The highest and most formidable of these *pongos,* which are descended on rafts, that of Mayasi, is however only three feet in height. Sometimes,

small rocky dikes are so near each other, that they form for several miles an uninterrupted succession of cascades and whirlpools, *chorros* and *remolinos;* these are properly what are called rapids, *raudales*. Such are the *yellalas*, or rapids of the Rio Zaire*, or Congo, which Captain Tuckey has recently made known to us; the rapids of the Orange river in Africa, above Pella; and the falls of the Missouri, which are four leagues in length, where the river issues from the Stony Mountains. Such also are the cataracts of Atures and Maypures; the only cataracts, which, situate in the equinoctial region of the New World, are decorated with the noble growth of palm trees. At all seasons they exhibit the aspect of real cascades, and present the greatest obstacles to the navigation of the Oroonoko, while the rapids of the Ohio† and of Upper Egypt are scarcely visible

* Voyage to explore the River Zaire, 1818, p. 152, 327, 340. What the inhabitants of Upper Egypt and Nubia call *chellál* in the Nile, is called *yellala* in the Rio Congo. This analogy between words signifying rapids is remarkable, on account of the enormous distance of the yellalas of the Congo from the chellal and djenadel of the Nile. Did the word chellal penetrate with the Moors into the west of Africa? If, with Mr. Burckhardt, we consider the origin of this word as Arabic (*Travels in Nubia*, 1819, p. 84), it must be derived from the root *challa* (to disperse), which forms *chelil*, water falling through a narrow channel.

† *Le Tort's rapids*, and the *falls of Louisville*.

at the period of high waters. A solitary cataract, like Niagara or the cascade of Terni, affords an admirable but single picture, that varies only as the observer changes his place. The rapids, on the contrary, above all when they are adorned with large trees, embellish a landscape during a length of several leagues. Sometimes the tumultuous movement of the waters is caused only by extraordinary contractions of the beds of the rivers. Such is the Angostura of Carare, in the river Magdalen, a strait that impedes the communication between Santa Fe de Bogota and the coast of Carthagena: such is the *pongo* of Manfericlie, in the Upper Maragnon, which Mr. de la Condamine thought much more dangerous than it really is, and which the pastor of San Borja is obliged to go up, every time that he exercises his ministry in the village of San Yago.

The Oroonoko, the Rio Negro, and almost all the confluents of the Amazon and the Maragnon, have falls or rapids, either because they cross the mountains where they take rise, or because they find other mountains in the middle of their course. If, as we have above observed, the Amazon, from the *pongo* of Manseriche (or, to speak with more precision, from the Pongo of Tayuchuc,) as far as it's mouth, a space of more than seven hundred and fifty leagues, furnish no tumultuous movement of the waters, this

river owes this immense advantage to the constant direction of it's course. It flows from west to east in a vast plain, that forms a longitudinal valley, between the mountains of Parima and the great mass of the mountains of Brazil.

I was surprised to find by actual measurements, that the rapids of the Oroonokō, the turbulent noise of which is heard at the distance of more than a league, and which are so eminently picturesque from the varied appearance of the waters, the palm trees, and the rocks, have not probably, on their whole length, a height of more than twenty-eight feet perpendicular. In reflecting on this, we find that it is a great deal for rapids, while it would be very little for a single cataract. The Yellalas of the Rio Congo, in the contracted part of the river from Banza Noki as far as Banza Inga, furnish, between the upper and lower levels, a much more considerable difference; but Mr. Barrow observes, that among the great number of these rapids there is one fall, which alone is thirty feet high. On the other hand, the famous pongos of the river Amazon, so dangerous to go up, the falls of Rentema, of Escurrebragas, and of Mayasi, have but a few feet of perpendicular height. They who are engaged in hydraulic works know the effect, that a bar of eighteen or twenty inches high produces in a great river. The whirling and tumultuous movement of the water does

not depend solely on the greatness of partial falls; what determines the force and impetuosity is the nearness of these falls, the steepness of the rocky dikes, the *returning sheets of water**, which strike against and surmount each other, the form of the islands and shoals, the direction of the counter currents, and the contraction and sinuosity of the channels through which the waters force a passage between two adjacent levels. In two rivers equally large, that of which the falls have least height may sometimes present the greatest dangers, and the most impetuous movements.

I have given with hesitation my opinion of the perpendicular height of the *raudales* of the Oroonoko, limiting it to one extreme quantity. I carried the barometer to the little plain, that surrounds the mission of Atures, and to the cataracts, but I could not obtain any constant differences. Every one knows how delicate a business it is, to measure small heights by the barometer. It would have required an instrument, in which the point of nought was not determined by a constant flowing. Little irregularities of the horary variation (irregularities that bear more on the quantity of the variation, than on the period) render the results uncer-

* *Bremontier, Recherches sur le Mouvement des Ondes*, 1809, § 6.

tain, when you have not two barometers at the two stations, and have to determine differences of half a line of atmospheric pressure.

It is probable, that the river loses part of the quantity of it's waters in the cataracts, not only on account of the increased evaporation owing to the dispersion of minute drops in the atmosphere, but still more from filtrations into the subterraneous cavities. These losses however are not very perceptible, when we compare the mass of waters entering into the *raudal* with that which issues out near the mouth of the Rio Anaveni. It was by a similar comparison that the existence of subterraneous cavities in the yellalas or rapids of the river Congo was discovered. The *pongo* of Manseriche, which ought rather to be called a strait than a fall, ingulfs, in a manner not yet sufficiently explored, a part of the waters, and all the floating wood of the Upper Maragnon.

When, seated on the bank of the Oroonoko, our eyes are fixed on those rocky dikes, the mind inquires, whether, in the lapse of ages, the falls change their form or height. I am not much inclined to believe in such effects of the shock of water against blocks of granite, and in the erosion of siliceous matter. The holes narrowed toward the bottom, the funnels that are discovered in the *raudales*, as well as near so many other cascades in Europe, are owing only to the

friction of the sand, and the movement of quartz pebbles. We have seen some of these pebbles, that were whirled perpetually by the current at the bottom of the funnels, and contributed to augment them in every direction. The *pongos* of the river Amazon are very destructible, because the rocky dikes are not granite, but a conglomerate, a red sandstone with large fragments. A part of the *pongo* of Rentema was broken down eighty years ago, and, the course of the waters being interrupted by a new bar, the bed of the river remained dry for some hours, to the great astonishment of the inhabitants of the village of Payaya, seven leagues below the *pongo*. The Indians of Atures assert (and in this their testimony is contrary to the opinion of Caulin *), that the rocks of the *raudal* preserve the same aspect; but that the partial torrents, into which the great river divides itself as it passes through

* *Historia corographica*, p. 72. This author seems to think, that the *raudales* have become easier to pass since the time of father Gumilla, because in 1743 the expedition of the boundaries, under the orders of Don Jose Solano, succeeded in making nine large boats (*champanes*) go up the raudales; while father Gumilla asserts, that *no hai otro arbitrio en el raudal de Atures que llevar las embarcationes por tierra.* The jesuit certainly could not mean, that the boats are transported by land the whole length of the rapids. I was assured on the spot, that the Indian pilots conveyed the *champanes* of the royal expedition up the cataracts, in the same manner as they have always done the small boats of travellers.

the heaped blocks of granite, change their direction, and carry sometimes more sometimes less water towards one or the other bank. The causes of these changes may be very remote from the cataracts; for in the rivers that spread life over the surface of the globe, as in the arteries by which it is diffused through organized bodies, all the movements are propagated to great distances. Oscillations, that at first seem partial, react on the whole liquid mass contained in the trunk, and in it's numerous ramifications.

I am not ignorant, that some writers, on comparing the actual state of the rapids of Syéne, the separate steps of which have scarcely a fall of six inches *, with the pompous descriptions of the ancients, have been eager to recognize in the bed of the Nile the effects of those erosions, of that action of running waters, by which geologists long believed, that they explained with success the formation of vallies, and the chaos of rents in the Cordilleras. The inspection of these places little favors this opinion. We will not deny the action of rivers and running waters, when they furrow friable ground, covered with secondary formations. But the granitic rocks

* The *chellal* between Philœ and Syene has ten steps, forming together 5 or 7 feet in height, according as the waters of the Nile are high or low. The length of the cataract is 500 toises.

of elephantina have probably no more changed their absolute height during thousands of years, than the summits of Mount Blanc and of Canigou. When you have closely inspected the great scenes of nature in different climates, it is impossible not to admit, that those deep clefts, those strata raised on end, those scattered blocks, those traces of a general convulsion, are the results of extraordinary causes, very different from those which act slowly on the surface of the globe in it's present state of tranquillity and repose. What the waters carry away from the granite by erosion, what the humid atmosphere destroys by it's contact with hard and undecomposed rocks, almost wholly escapes our perception; and I cannot believe, as some geologists admit, that the granitic summits of the Alps and the Pyrenees lower in proportion to the accumulation of pebbles in the gullies at the foot of the mountains. In the Nile, as well as in the Oroonoko, the rapids may diminish their fall, without the rocky dikes being perceptibly altered. The relative height of falls may be changed by the deposits of mud formed below the rapids. The beds of rivers, on account of the action of the currents, tend incessantly toward a kind of curve, upon which depends what is called the *stability of the bed;* and this stability can be affected only by the transport of friable matters, which the waters carry away,

and again deposit continually in places where they diminish in velocity.

If these reflexions throw some light on the interesting phenomenon of cataracts, they are not sufficient, I confess, to explain the exaggerated accounts, which the ancients* have left us of the rapids of Syene. Did they not attribute to this lower fall what they had vaguely learned of the upper falls of the river, those of Nubia and Dongola, which are more numerous, and more formidable†? Syene stood on the

* Strabo must be excepted, whose description is no less simple than accurate. According to this author, the rapidity and direction of the currents have changed since the century before our era; the *chellal* could then be ascended on both sides. There now exists a navigable channel only on one side. The passage of the cataract is therefore become less easy. Strab. Lib. xvii, p. 817 (translation of Mr. Letronne, vol. v, p. 428).

† See Jemard, in the *Description de l'Egypte ancienne, Syène*, p. 17 and 28. Messrs. Burkhardt and Banks, Lord Belmore, and Mr. Salt, have recently visited these upper cataracts. Those of Sukkoy, situate above Ebsambal, at the boundary between the zones of sandstone and granite, are heard at a distance of two miles. South of the great *Djenadel*, in the desert of Batn el Hadjar, several less considerable rapids follow. The southernmost cataract of the Nile, or rather of the two Niles united, is that of Koke, near Napata. (See the learned article *Egypt*, by Doctor Thomas Young, in the 4th vol. of the *Encyclop. Britannica.*) Had the ancients a confused notion of the great cataracts of the eastern Nile, or the Blue Nile, which have an elevation of more than 200 feet

limits of the Roman empire *, almost at those of the known world; and in space, as in the conceptions of the human understanding, fantastic images are created where positive ideas end.

The inhabitants of Atures and Maypures, whatever the missionaries may have asserted in their works, are not more struck with deafness by the noise of the great cataracts, than the Catadupes of the Nile. When this noise is heard in the plain that surrounds the mission, at the distance of more than a league, you seem to be near a coast skirted by reefs and breakers. The noise is three times as loud by night as by day, and gives an inexpressible charm to these solitary scenes. What can be the cause of this increased intensity of sound in a desert, where nothing seems to interrupt the silence of nature? The velocity of the propagation of sound, far from augmenting, decreases with the lowering of the temperature. The intensity diminishes in air agitated by a wind, which is contrary to the direction of the sound; it diminishes also by dilatation of the air, and is weaker in the higher than in the lower regions of the atmosphere, where the number of particles of air in motion

between Fazuclo, and Alata? (Bruce's Travels, vol. v, p. 105, 316.)

* *Claustra imperii romani*, says Tacitus. In the name of the Island *Philæ* we recognize the Coptic word *phe-lakh*, the extremity (the end of Egypt).

is greater in the same radius. The intensity is the same in dry air, and in air mingled with vapours; but it is feebler in carbonic acid gas, than in mixtures of azot and oxygen. From these facts, which are all we know with any certainty, it is difficult to explain a phenomenon observed near every cascade in Europe, and which, long before our arrival in the village of Atures, had struck the missionary and the Indians. The nocturnal temperature of the atmosphere is 3° less than the temperature of the day; at the same time the apparent humidity augments at night, and the mist that covers the cataracts becomes thicker. We have just seen, that the hygroscopic state of the air has no influence on the propagation of the sound, and that the cooling of the air diminishes it's swiftness.

It may be thought, that, even in places not inhabited by man, the hum of insects, the song of birds, the rustling of leaves agitated by the feeblest winds, occasion during the day a confused noise, which we perceive the less because it is uniform, and constantly strikes the ear. Now this noise, however slightly perceptible it may be, may diminish the intensity of a louder noise; and this diminution may cease, if during the calm of the night the song of birds, the hum of insects, and the action of the wind upon the leaves, be interrupted. But this reasoning, even admitting it's justness, can scarcely be ap-

plied to the forests of the Oroonoko, where the air is constantly filled by an innumerable quantity of moschettoes, where the hum of insects is much louder by night than by day, and where the breeze, if ever it be felt, blows only after sunset.

I rather think, that the presence of the sun acts upon the propagation and intensity of the sound by the obstacles, which they find in the currents of air of different density, and the partial undulations of the atmosphere caused by the unequal heating of different parts of the soil. In calm air, whether it be dry, or mingled with vesicular vapours equally distributed, the *sonorous undulation* is propagated without difficulty. But when the air is crossed in every direction by small currents of hotter air, the sonorous undulation is divided into two undulations, where the density of the medium changes abruptly; partial echoes are formed, that weaken the sound, because one of the streams comes back upon itself; and those divisions of undulations take place, of which Mr. Poisson has recently developed the theory with great sagacity *. It is not therefore the movement of the particles of air from below to above in the ascending current, or the small oblique currents, that we consider as opposing by a shock the

* *Annales de Chimie*, tom. vii, p. 293.

propagation of the sonorous undulations. A shock, given to the surface of a liquid, will form circles around the centre of percussion, even when the liquid is agitated. Several kinds of undulations may cross each other in water, as in air, without being disturbed in their propagation; little movements may *ride over each other*, and the real cause of the less intensity of sound during the day appears to be the interruption of homogeneity in the elastic medium. During the day, there is a sudden interruption of density, wherever small streamlets of air of a high temperature rise over parts of the soil unequally heated. The sonorous undulations are divided, as the rays of light are refracted, and form the *mirage* (looming), wherever strata of air of unequal density are contiguous. The propagation of sound is altered, when a stratum of hydrogen gas is made to rise in a tube closed at one end above a stratum of atmospheric air; and Mr. Biot has well explained by the interposition of bubbles of carbonic acid gas, why a glass filled with Champagne wine is little sonorous so long as the gas is evolved, and continues to pass through the strata of the liquid.

In announcing these ideas, I might almost rest on the authority of an ancient philosopher, whom the moderns continue to treat with disdain, though the most distinguished zoologists have long rendered ample justice to the saga-

city of his observations. "Why," says Aristotle in his curious book of *Problems*, "why is sound better heard during the night? Because there is more calmness on account of the absence of caloric *(of the hottest)**. This absence

* I have placed in a parenthesis, a literal version of the term employed by Aristotle, to express in reality what we now term the matter of heat. Theodore de Gaza, in his Latin translation, expresses in the shape of a doubt what Aristotle positively asserts. I shall remark on this occasion, that, notwithstanding the imperfect state of science among the ancients, the works of the Stagirite contain more ingenious observations, than those of other philosophers. It is in vain we look in Aristoxenes (*Lib. de Musica*), in Theophilactus Simocatta (*de Quæstionibus physicis*), or in the 5th Book of the *Quæst. nat.* of Seneca, for an explanation of the nocturnal augmentation of sound. A person deeply versed in the knowledge of the ancients, Mr. Laurencit, has communicated to me a passage of Plutarch (*ed. Par.*, 1624, vol. ii, p. 721, D), which confirms that of Aristotle, and which I shall cite, from the simple version of Amyot. "Boethus, le premier interlocuteur, prétend que la froidure de la nuit fige et condense l'air, et que l'on entend mal le son pendant le jour, parce qu'il y a moins de vides. Ammonius, le second interlocuteur, rejette les vides de Boethus, et admet, avec Anaxagore, que, de jour, le soleil remue l'air d'un mouvement tremblant et plein de battement; que l'on entend mal le jour à cause de la poussière qui volette dans l'air, qui siffle et qui murmure, mais que, la nuit, le branlement cesse, et par conséquent le sifflement de la poussière. Boethus se justifie de vouloir corriger Anaxagore; mais il pense qu'il faut renoncer aux sons des petits corps, et qu'il suffit d'admettre le branlement et le mouvement d'iceux. L'air étant la substance propre à la voix, s'il est rassis, donne voie toute droite, unie

renders every thing calmer, for the sun is the principle of all movement." Aristotle had no doubt a vague presentiment of the cause of the phenomenon; but he attributes to the motion of the atmosphere, and the shock of the particles of air, what seems to be rather owing to abrupt changes of density in the contiguous strata of air.

The 16th of April, towards evening, we received tidings, that in less than six hours our boat had passed the rapids, and arrived in good condition in a cove called *el Puerto de arriba* *, or the *Port of the Expedition.* "Your boat will not be wrecked, because you carry no merchandize, and travel with the monk of the *raudales*," was said to us sneeringly by a little brown man, whom by his accent we recognized to be a Catalan, at the encampment of Pararuma. He was a trader in tortoise-oil, who trafficked with the Indians of the missions, and was no great friend

et continue aux petites parcelles et au mouvement de la voix de tout loin. La bonace tranquille est résonnante; au contraire, la tourmente est sourde. L'agitation de l'air ne permet pas que la forme de la voix, bien expresse et articulée, arrive jusqu'au sentiment, mais toujours en ôte et emporte quelque chose de la force et de la grandeur. Le soleil, ce grand gouverneur et capitaine du ciel, remue jusqu'aux moindres parcelles de l'air; et, tout aussitôt qu'il se montre, il excite et remue toute chose." (*Œuvres de Plutarque, par Amyot, éd. de Broter.* 1802, Tom. viii, p. 385.)

* *Upper harbour.*

to the missionaries. "The frail vessels," he added, "are those of the Catalans, when, provided with a licence from the Governor of Guayana, and not with a permission from the president of the missions, they endeavour to trade beyond Atures and Maypures. After having caused our boats to be wrecked in the *raudales*, which are the key of the missions of the Upper Oroonoko, the Cassiquiare, and the Rio Negro, they make the Indians of Atures reconduct us to Carichana, and oblige us to relinquish our mercantile speculations." An impartial historian of the country through which I passed, I do not adopt an opinion advanced perhaps too lightly. The present missionary of the *raudales* is incapable of exercising the vexations, of which the little Catalan traders complain; but it may be asked, what is the source of this profound hatred of the government of the missions, even in the Spanish colonies? If the rich only were calumniated, the missionaries of the Upper Oroonoko ought to escape the shafts of malignity. They do not possess a house, a goat, scarcely even a cow; while their brethren, the Capuchins of the missions of Carony, have herds of 40,000 cattle. It is not then against the wealth of the *Observantins*, that the resentment of the industrious class of the planters is directed; but against the exclusive principles of their government, that obstinate tendency to shut their ter-

ritory to white men, and the shackles which they lay on the exchange of productions. Monopolies every where irritate the people; not only such as have an influence on commerce and the material wants of life, but also the right, which one cast or branch of the community arrogates to itself, of bringing up youth, or of governing, not to say civilizing, the savages.

We were shown in the little church of Atures some remains of the ancient wealth of the Jesuits. A silver lamp of considerable weight lay on the ground half-buried in the sand. Such an object, it is true, would no where tempt the cupidity of the savage; yet I ought here to remark, to the honor of the natives of Oroonoko, that they are not addicted to stealing, like the much less savage tribes of the islands in the South Sea. The former have a great respect for property; they do not even attempt to steal provision, hooks, or hatchets. At Maypures and Atures locks on the doors are unknown; they will be introduced only when whites and men of mixed race establish themselves in the missions.

The Indians of Atures are mild, moderate, and accustomed, from the effects of their idleness, to the greatest privations. Formerly, excited to labour by the Jesuits, they did not want for food. The fathers cultivated maize, French beans *(frisoles)*, and other European vegeta-

bles; they even planted sweet oranges and tamarinds round the villages; and they possessed twenty or thirty thousand head of cows and horses, in the savannahs of Atures and Carichana. They had at their service a great number of slaves and servants *(peones)*, to take care of their herds. Nothing is now cultivated but a little cassava, and a few plantains. The fertility of the soil however is such, that at Atures I counted on a single branch of musa 108 fruits, 4 or 5 of which would almost suffice for the daily nourishment of a man. The culture of maize is entirely neglected, and the horses and cows have disappeared. Near the *raudal*, a part of the village still bears the name of *Passo del ganado* (ford of the cattle), while the descendants of those very Indians, whom the Jesuits had assembled in a mission, speak of horned cattle as of animals of a race that is lost. In going up the Oroonoko, toward San Carlos del Rio Negro, we saw the last cow at Carichana. The fathers of the Observance, who now govern these vast countries, did not immediately succeed the Jesuits. During an interregnum of eighteen years, the missions were visited only from time to time, and by Capuchin monks. The agents of the secular government, under the title of *Commissioners of the King*, managed the *hatos* or farms of the Jesuits with culpable negligence. They killed the cattle in order to

sell the hides. Many heifers were devoured by tigers, and a greater number perished in consequence of wounds made by the bats of the *raudales*, which are much less, but far bolder than the bats of the Llanos. At the time of the expedition of the boundaries, the horses of Encaramada, Carichana, and Atures, were conveyed as far as San Jose of Maravitanos, where, on the banks of the Rio Negro, the Portugueze could only procure them after a long passage, and of a very inferiour quality, by the river Amazon and Grand Para. Since the year 1795, the cattle of the Jesuits have entirely disappeared. There now remains in testimony of the ancient cultivation of these countries, and the industrious activity of the first missionaries, only a few trunks of the orange and tamarind in the savannahs, surrounded by wild trees.

The tigers, or jaguars, which are less dangerous for the cattle than the bats, come into the village at Atures, and devour the pigs of the poor Indians. The missionary related to us a striking instance of the familiarity of these animals, upon the whole so ferocious. Some months before our arrival, a jaguar, which was thought to be young, though of a large size, had wounded a child in playing with him; I use confidently this expression, which may seem strange, having on the spot verified facts which are not without interest in the history of the

manners of animals. Two Indian children, a boy and a girl, about eight and nine years of age, were seated on the grass near the village of Atures, in the middle of a savannah, which we have often traversed. At two o'clock in the afternoon, a jaguar issued from the forest, and approached the children, bounding around them; sometimes he hid himself in the high grass, sometimes he sprang forward, his back bent, his head hung down, in the manner of our cats. The little boy, ignorant of his danger, seemed to be sensible of it only when the jaguar with one of his paws gave him some blows on the head. These blows, at first slight, became ruder and ruder, the claws of the jaguar wounded the child, and the blood flowed with violence. The little girl then took a branch of a tree, struck the animal, and it fled from her. The Indians ran up at the cries of the children, and saw the jaguar, which retired bounding, without making the least show of resistance.

The little boy was brought to us, who appeared lively and intelligent. The claw of the jaguar had taken away the skin from the lower part of the forehead, and there was a second scar at the top of the head. What meant this fit of playfulness in an animal, which is not difficult to tame in our menageries, but which shows itself always so wild and cruel in a savage state? If we admit, that, being sure of it's

prey, it played with the little Indian, as our cats play with birds, the wings of which have been clipped, how shall we explain the patience of a jaguar of large size, which sees itself pursued by a little girl? If the jaguar were not pressed by hunger, why was it seen to approach the children? There is something mysterious in the affections and hatreds of animals. We have seen lions kill three or four dogs, that were put into their den, and instantly caress a fifth, which, less timid, took the king of animals by the mane. These are instincts of which men know not the secret. It would seem as if weakness inspired so much the more interest, in proportion as it appeared more confiding.

We have mentioned, that domestic pigs are attacked by the jaguars. There are in these countries, beside the common pigs of European race, several species of pecaris, or pigs with lumbar glands, two of which only are known to the naturalist of Europe. The Indians call the little pecari (*dicotiles torquatus*, Cuv.) in the Maypure tongue *chacharo* *; while they give the name of *apida* † to a pig, which they say has no

* Or *paquira* in Tamanack, whence is derived the Creole word *baquira*.

† *Gili*, vol. I, p. 252. *Caulin, Histo. corog.*, p. 37. *Gumilla*, vol I, p. 295. The apida is probably the great pecari of our collections, or dicotiles labiatus. It is possible, that the lumbar glands are not equally apparent in all the three species on the banks of the Oroonoko, the puinke, the apida or tirigua, and the chacharo or potiche.

pouch, is larger, and of a dark brown colour, with the lower jaw and the abdominal zone white. The chacharo, reared in the houses, becomes tame like our sheep and goats. It reminds us by the gentleness of it's manners of the curious analogies which anatomists have observed, between the pecaris and the ruminating animals. The apida, which is domesticated like our swine in Europe, wanders in large herds composed of several hundreds. These herds are announced from far, not only by their hollow and hoarse gruntings, but above all by the impetuosity with which they break down the shrubs in their way. Mr. Bonpland, in an herborising excursion, warned by his Indian guide to hide himself behind the trunk of a tree, saw a number of these pecaris (*cochinos* or *puercos del monte*) pass close by him. The herd marched in a close body, the males before, and each sow accompanied by her young. The flesh of the *chacharo* is flabby, and little agreeable; it affords however a plentiful nourishment to the natives, who kill these animals with small lances tied to cords. We were assured at Atures, that the tiger dreads being surrounded in the forests by these herds of wild pigs; and that, to avoid being stifled, he tries to save himself on a tree. Is this a hunter's tale, or a fact duly observed? We shall soon see, that in several parts of America the hunters believe in the existence of a

javali, or native boar with external recurved tusks*. I never saw one, but this animal is mentioned in the works of the Spanish missionaries, a source too much neglected by zoologists, though they contain, amid the grossest exagerations, very curious local observations.

Among the monkeys, which we saw at the mission of the Atures, we found one new species, of the tribe of *sais* and *sajous*, which the Creoles vulgarly call *machis*. It is the *ouavapavi* with gray hair and a bluish face. It has the orbits of the eyes, and forehead, as white as snow, which at first sight distinguish it from the *simia capucina*, the *simia apella*, the *simia trepida*, and the other weeping monkeys hitherto so confusedly described†. This little animal is as gentle as it is ugly. Every day in the courtyard of the missionary it seized a pig, upon which it remained from morning till night, traversing the savannahs. We have also seen it upon the back

* Mr. Cortes asserts, that he killed on the borders of the Magdalena a wild boar, *puerco mana*, with recurved tusks, and longitudinal stripes on the back. Are there hogs from Europe in this country, that have become wild?

† See my Monography of the Oroonoko monkeys, in the *Rec. Obs. Zoologic.*, vol. i, p. 324 and 356. The ouavapavi (a word of the Guareken language) is my *simia albifrons*, ex albo cinerascens, vertice nigro, facie cærulea, fronte et orbitis niveis, cruribus et brachiis fuscescentibus.

of a large cat, which had been brought up with it in father Zea's house.

It was among the cataracts that we began to hear of the hairy man of the woods, called salvaje, that carries off women, constructs huts, and sometimes eats human flesh. The Tamanacks call it *achi* *, and the Maypures *vasitri*, or *great devil.* The natives and the missionaries have no doubt of the existence of this anthropomorphous monkey, which they singularly dread. Father Gili† gravely relates the history of a lady in the town of San Carlos‡, who much praised the gentle character and attentions of the man of the woods. She lived several years with one in great domestic harmony, and only requested some hunters to take her back, "because she was tired, she and her children (a little hairy also), of living far from the church and the sacraments." The same author, notwithstanding his credulity, confesses, that he had not been able to find an Indian, who asserted positively that he had seen the *salvaje* with his own eyes. This fable, which the missionaries, the European planters, and the negroes of Africa, have no doubt embellished with many features taken from the description of the manners of the

* Pronounce *atschi*.

† Saggio, vol. i, p. 248, 315.

‡ In the Llanos of Venezuela.

ourang outang*, the gibbon, the jocko or chimpanzee, and the pongo, pursued us during five years from the northern to the southern hemisphere; and we were every where blamed, in the most cultivated class of society, for being the only persons to doubt the existence of the great anthropomorphous monkey of America. We shall first observe, that there are certain regions, where this belief is particularly prevalent among the people; such are the banks of the Upper Oroonoko†, the valley of Upar near the lake of Maracaybo, the mountains of Santa Martha and of Merida, the provinces of Quixos, and the banks of the Amazon near Tomependa. In all these places, so distant one from the other, it is repeated, that the *salvaje* is easily recognized by the traces of it's feet, the toes of which are

* Simia satyrus. We must not believe, notwithstanding the assertions of almost all zoological writers, that the word *orang outang* is applied exclusively in the Malay language to the simia satyrus of Borneo. This expression, on the contrary, means any very large monkey, that resembles man in figure. (*Marsden, Hist. of Sumatra*, 3d edit., p. 117). Modern zoologists have arbitrarily appropriated provincial names to certain species; and by continuing to prefer these names, strangely disfigured in their orthography, to the latin systematic names, the confusion of the nomenclature has been increased.

† Near the Rio Paruasi (see vol. iv, p. 540) a mountain bears the name of Achi-tipuiri, which means in Tamanack *mountain of the man of the woods.*

turned backward. But if there exist a monkey of a large size in the New Continent, how has it happened, that during three centuries no man worthy of belief has been able to procure the skin of one? Several hypotheses present themselves to the mind, in order to explain the source of so ancient an error or belief. Has the famous *capuchin* monkey of Esmeralda *, the canine teeth of which are more than six lines and a half long, the physiognomy much more like man's † than that of the ourang outang, and which, when irritated, rubs it's beard with it's hand, given rise to the fable of the *salvaje*? It is not so large indeed as the coaïta (*simia paniscus*); but when seen at the top of a tree, and the head only visible, it might easily be taken for a human being. It may be also (and this opinion appears to me the most probable), that the man of the woods was one of those large bears, the footsteps of which resemble those of a man, and which is believed in every country to attack women. The animal killed in my time at the foot of the mountains of Merida, and sent, by the name of *salvaje*, to Colonel Ungaro, the governor of the province Varinas, was in fact a bear with black and smooth fur. Our fellow-traveller, Don Nicolas Sotto, had examined it closely. Did

* Simia chiropotes. See my *Obs. de Zool.*, voll i, p. 312.

† The whole of the features, the expression of the physiognomy, not the forehead.

the strange idea of a plantigrade animal, the toes of which are placed as if it walked backward, take it's origin from the habit of the real savages of the woods, the Indians of the weakest and most timid tribes, of deceiving their enemies, when they enter a forest, or cross a sandy shore, by covering the traces of their feet with sand, or walking backward?

I have just expressed my doubts of the existence of an unknown species of large monkey in a continent, which appears entirely destitute of quadrumanes of the family of the ourangs, cynocephali, mandrils, and pongoes. Let us not forget, that all articles of popular belief, even the most absurd in appearance, repose on real facts, but ill observed. In treating them with disdain, the traces of a discovery may often be lost in natural philosophy, as well as in zoology. We will not then admit, with a Spanish author, that the fable of the man of the woods was invented by the artifice of Indian women, who pretended to have been carried off, when they had been long absent unknown to their husbands; we rather counsel travellers, who shall visit after us the missions of the Oroonoko, to continue our researches on the *salvaje* or *great devil* of the woods; and examine whether it be some unknown species of bear, or some very rare monkey analogous to the simia chiro-

potes, or simia satanas, that can have given rise to such singular tales.

After having spent two days near the cataract of Atures, we were glad to have our boat reladen, and leave a spot where the temperature of the air is generally by day twenty-nine degrees, and by night twenty-six degrees of the centigrade thermometer. This temperature seemed to us to be still much more elevated, from the feeling of heat which we experienced. The want of concordance between the instruments and the sensations must be attributed to the continual irritation of the skin excited by the moschettoes. An atmosphere filled with venomous insects always appears to be more heated than it is in reality. Saussure's hygrometer, observed as usual in the shade*, marked by day, at the *minimum* (at three in the afternoon) 78·2°; by night, at the *maximum*, 81·5°. This degree of humidity is 5° less than the mean humidity of the coast of Cumana; but it is 10° above the mean humidity of the *Llanos*, or plains destitute of trees. The cataracts and the thickness of the

* From 42° to 45° of the whale-bone hygrometer. (See vol. iv, p. 145, 326, and 400. The barometer rose on the 15th of April, at the *puerto de arriba de Atures* (at ten in the morning) to 336·5 lines; in the village, situate in the middle of a small table-land, on the 16th of April, at eleven in the morning, to 334·3 lines. The centigrade thermometer at noon in the shade was at 27·2°; in the sun at 31·9°; apparent action of the sun, 4·7°.

forests contribute to augment the quantity of vapours contained in the air. We were horribly tormented in the day by the *moschettoes*, and the *jejen*, small venomous flies, or simuliums, and at night, by the *zancudoes*, a large species of gnat, that are dreaded even by the natives. We began to have our hands much swelled, and this swelling increased daily till our arrival on the banks of the Temi. The means that are employed to escape from these little animals are very extraordinary. The good missionary Bernardo Zea, who passes his life tormented by moschettoes, had constructed near the church, on a scaffolding of trunks of palm-trees, a small apartment, in which we breathed more freely. To this we went up in the evening, by means of a ladder, to dry our plants, and write our journal. The missionary had justly observed, that the insects abounded more particularly in the lowest strata of the atmosphere, that which reaches from the ground to the height of twelve or fifteen feet. At Maypures the Indians quit the village at night, to go and sleep on the little islets in the midst of the cataracts. There they enjoy some rest; the moschettoes appearing to shun air loaded with vapours. We found every where fewer in the middle of the river, than near it's banks, and thus less is suffered in descending the Oroonoko, than in going up in a boat.

Persons who have not navigated the great rivers of equinoctial America, for instance, the Oroonoko and the Rio Magdalena, can scarcely conceive, how without interruption, at every instant of life, you may be tormented by insects flying in the air, and how the multitude of these little animals may render vast regions almost uninhabitable. However accustomed you may be to endure pain without complaint, however lively an interest you may take in the objects of your researches, it is impossible not to be constantly disturbed by the moschettoes, *zancudoes*, *jejens*, and *tempraneroes*, that cover the face and hands, pierce the clothes with their long sucker in the form of a needle, and, getting into the mouth and nostrils, set you coughing and sneezing whenever you attempt to speak in the open air. In the missions of the Oroonoko, in the villages placed on the banks of the river, surrounded by immense forests, the *plaga de las moscas*, the plague of the flies, affords an inexhaustible subject of conversation. When two persons meet in the morning, the first questions they address to each other are, "How did you find the zancudoes during the night? How are we to day for the moschettoes*." These questions remind us of a Chinese form of politeness,

* *Que le han parecido los zancudos de noche? como stamos hoy de mosquitos?*

which indicates the ancient state of the country where it took birth. Salutations were made heretofore in the *celestial empire* in the following words, *vou-to-hou**, " Have you been incommoded in the night by the serpents?" We shall soon see, that on the banks of the Tuamini, in the river Magdalena, and still more at Choco, the country of gold and platina, the Chinese compliment on the serpents might be added to that of the moschettoes.

This is the place in which to speak of the *geographical distribution* of those insects of the family of tipulæ, which affords very remarkable phenomena. It does not appear to depend solely on the heat of the climate, the excess of humidity, or the thickness of forests, but on local circumstances, that are difficult to characterize. It may be first observed, that the plague of *moschettoes* and *zancudoes* is not so general in the torrid zones, as is commonly believed. On the table-lands, elevated more than four hundred toises above the level of the ocean, in the very dry plains remote from the beds of great rivers, for instance at Cumana and Calabozo, there are not sensibly more gnats, than in the most populous parts of Europe. They are perceived to augment enormously at Nueva Barcelona, and more to the west, on the coast that extends to-

* Deguignes, *Dict. Chinois*, p. 26.

ward Cape Codera. Between the little harbour of Higuerote* and the mouth of the Rio Unare, the wretched inhabitants are accustomed, to stretch themselves on the ground, and pass the night buried in the sand three or four inches deep, leaving out the head only, which they cover with a handkerchief. You suffer from the sting of insects, but in a manner easy to bear, in descending the Oroonoko from Cabruta toward Angostura, and in going up from Cabruta toward Uruana, between the latitudes of 7° and 8°. But beyond the mouth of the Rio Arauca, when you have passed the strait of Baraguan, the scene suddenly changes. From this spot there is no more repose for the traveller. If he have any poetical remembrance of Dante, he will think he has entered the *citta dolente*, he will seem to read on the granitic rocks of Baraguan these memorable lines of the third canto;

> Noi sem venuti al luogo, ov' i' t'ho detto
> Che tu vedrai le genti dolorose†.

The lower strata of air, from the surface of the ground to the height of fifteen or twenty feet, are filled with venomous insects like a condensed vapour. If in an obscure spot, for instance in the grottoes of the cataracts formed

* See vol. iii, p. 370.

† Inferno, canto iii, 16.

by superincumbent blocks of granite, you direct your eyes toward the opening enlightened by the sun, you see clouds of moschettoes more or less thick, according as these little animals, in their slow and regular movements to their own music [*mouvemens lents et cadencés*], form into groups, or spread themselves abroad. At the mission of San Borja, the suffering from moschettoes is greater than at Carichana; but in the *raudales*, at Atures, and above all at Maypures, this suffering may be said to attain it's *maximum*. I doubt whether there be a country upon Earth, where man is exposed to more cruel torments in the rainy season. Having passed the fifth degree of latitude, you are somewhat less stung; but on the Upper Oroonoko the stings are more painful, because the heat, and the absolute want of wind, renders the air more burning, and more irritating in it's contact with the skin.

"How comfortable must people be in the moon!" said a Saliva Indian to father Gumilla; "she looks so beautiful and so clear, that she must be free from moschettoes." These words, which denote the infancy of a people, are very remarkable. The satellite of the Earth is every where to the American savage the abode of the blessed, the country of abundance. The Eskimo, who counts among his riches a plank, a trunk of a tree, thrown by the currents on a coast destitute of vegetation, sees in the moon

plains covered with forests; the Indian of the forests of Oroonoko there beholds open savannahs, where the inhabitants are never stung by moschettoes.

Arrived farther toward the south, where the system of yellowish-brown waters commences, generally called *black waters*, *aguas negras*, on the banks of the Atabapo, the Tuni, the Tuamini, and the Rio Negro, we enjoyed a repose, I had almost said a happiness, unexpected. These rivers cross thick forests, like the Oroonoko, but the *tipulary* insects, as well as the crocodiles, shun the proximity of the *black waters*. Are these waters, which are a little colder, and chemically different from the white waters, adverse to the larvæ and the chrysalids of *tipulary* insects and gnats, which may be considered as real aquatic animals? Some small rivers, the colour of which is deep blue, or yellowish brown, the Toparo, the Mataveni, and the Zama, are exceptions to the almost general rule of the absence of moschettoes over the *black waters*. These three rivers swarm with them; and the Indians themselves fixed our attention on the problematic causes of this phenomenon. In going down the Rio Negro, we breathed freely at Maroa, Daripe, and San Carlos, villages situate on the boundaries of Brazil. But this improvement of our situation was of short continuance; our sufferings recommenced as soon as we en-

tered the Cassiquiare. At Esmeralda, at the eastern extremity of the Upper Oroonoko, where ends the known world of the Spaniards, the clouds of moschettoes are almost as thick as at the great cataracts. At Mandavaca we found an old missionary, who told us with an air of sadness, that he had spent *his twenty years of moschettoes* * in America. He desired us to look well at his legs, that we might be able to tell one day, " por alla (beyond sea), what the poor monks suffer in the forests of Cassiquiare." Every sting leaving a small darkish brown point, his legs were so speckled, that it was difficult to recognize the whiteness of his skin through the spots of coagulated blood. If the insects of the simulium genus abound in the Cassiquiare, which has *white waters*, the culices, or *zancudoes*, are so much the more rare; you scarcely find any there, while on the rivers of *black waters*, in the Atabapo and the Rio Negro, there are generally some *zancudoes* and no *moschettoes*. We have mentioned above, that in the petty revolutions, which from time to time agitate the order of the Observance of St. Francis, when the padre-guardian chooses to exercise his vengeance on a lay brother, he sends him to Esmeralda; this is a state of exile, or, as the monks jocularly say, he is *condemned to the moschettoes*.

* " *Ya tengo mis vente annos de mosquitos.*"

I have just shown, from my own observations, how much the geographical distribution of venomous insects varies in this labyrinth of rivers with white and black waters. It were to be wished, that a learned entomologist could study on the spot the specific differences of these noxious insects*, which in the torrid zone, in spite of their littleness, act an important part in the economy of nature. What appeared to us very remarkable, and is a fact known to all the missionaries, is, that the different species do not associate together, and that at different hours of the day you are stung by distinct species. Every time that the scene changes, and, to use the simple expression of the missionaries, other insects "mount guard," you have a few minutes, often a quarter of an hour of repose. The insects that disappear have not their places instantly supplied in equal numbers by their successors. From half after six in the morning till five in the afternoon, the air is filled with moschettoes; which have not, as we find related in some travels†, the form of our gnats‡, but

* The *mosquitos bovos* or *tenbiguài*; the *meleros*, which always settle upon the eyes; the *tempraneros, or putchiki*; the *jejenes*; the gnat *rivaù*; the great *zancudos*, or *matchaki*; the *cafafi*, &c.

† *Kalm, Reise in Nord-America*, tom. ii, p. 263.

‡ *Culex pipiens*. This difference between *mosquito* (little fly, simulium) and *zancudo* (gnat, culex) exists in all the

that of a small fly. They are simuliums of the family nemoceræ of the system of Latreille. Their sting is as painful as that of the *stomoxes**. It leaves a little reddish brown spot, which is extravasated and coagulated blood, where their proboscis has pierced the skin. An hour before sunset a species of small gnats, called *tempraneros*†, because they appear also at sunrise, take the place of the moschettoes. Their presence scarcely lasts an hour and a half; they disappear between six and seven in the evening, or, as they say here, after the *Angelus* (*a la oracion*). After a few minutes repose, you feel yourself stung by *zancudoes*, another species of gnat (culex) with very long legs ‡. The zancudo, the proboscis of which contains a sharp-pointed sucker, causes the most acute pain, and

Spanish colonies. The word *zancudo* signifies *longipes*, long-legs, *qui ticne las zancas largas*. The *moschettoes* of the Oroonoko are the *moustiques*; the *zancudoes* are the *maringouins* of French travellers.

* *Conops calcitrans.*

† *Which appear at an early hour* (*temprano*). Some persons say, that the *zancudo* is the same *tempranero*, which returns at night, after hiding itself for some time. I have doubts of this identity of the species; the pain caused by the sting of the two insects appeared to me different.

‡ The *zancudoes* of the Oroonoko, called *aniù* by the Maypures, have the corselet of a brownish green, with white wings, the feet blackish brown, with the extremities white.

a swelling that remains several weeks. It's hum resembles that of our gnats in Europe, but is louder and more prolonged. The Indians pretend to distinguish " by their song" the *zancudoes* and the *tempraneroes;* the latter of which are real *twilight insects,* while the *zancudoes* are most frequently *nocturnal insects,* and disappear toward sunrise.

In our way from Carthagena to Santa Fe de Bogota, we observed, that between Mompox and Honda, in the valley of the great Rio Magdalena, the zancudoes darkened the air from eight in the evening till midnight; that toward midnight they diminished in number, and were hidden for three or four hours; and lastly that they returned in crowds, and with a voracious appetite, toward four in the morning. What is the cause of these alternations of motion and rest? Are these animals fatigued by long flight? It is very rare at Oroonoko to see real gnats by day; while at the river of Magdalena we were stung night and day, except from noon till two o'clock. The zancudoes of the two rivers are no doubt of different species; are the *compound* eyes of one of these species more affected by the splendor of the solar light than the eyes of the other?

We have seen, that the insects of the tropics every where follow a certain standard in the periods at which they alternately arrive and dis-

appear. At fixed and invariable hours, in the same season, and the same latitude, the air is peopled with new inhabitants, and in a zone where the barometer becomes a clock*, where every thing proceeds with such admirable regularity, we might guess blindfold the hour of the day or night, by the hum of the insects, and by their stings, the pain of which differs according to the nature of the poison, that each insect deposits in the wound.

At a period when the geography of animals and of plants had not yet been studied, the analogous species of different climates were often confounded. It was believed, that the pines and ranunculuses, the stags, the rats, and the tipulary insects of the north of Europe, were to be found in Japan, on the ridge of the Andes, and at the straits of Magellan. Naturalists justly celebrated have thought, that the *zancudo* of the torrid zone was the gnat of our marshes, become more vigorous, more voracious, and more noxious, under the influence of a burning climate. This is a very erroneous opinion. I carefully examined and described upon the spot those zancudoes, which torment us the most. In the rivers Magdalena and Guayaquil alone there are five distinct species. Mr. La-

* By the extreme regularity of the horary variations of the atmospheric pressure.

treille, the first entomologist of the age, was kind enough to look over the detailed description of those little animals, which I shall give in a note*.

* The following is the description of the five new species :

1. CULEX CYANOPENNIS, *abdomine fusco, piloso, annulis sex albis ; alis cæruleis, tarsis albo annulatis.* Thorax fusco-ater, pilosus. Abdomen supra fusco-cærulescens, hirtum, annulis sex albis. Alæ cæruleæ, splendore semi-metallico, viridenti-venosæ, sæpe pulverulentæ, margine externo ciliato. Pedes fusci, tibiis hirtis, tarsis nigrioribus, annulis quatuor niveis. Antennæ maris pectinatæ.

Habitat locis paludosis ad ripam Magdalenæ fluminis prope Teneriffe, Mompox, Chilloa, Tamalameque cæt. (Regno Novogranatensi.)

2. CULEX LINEATUS, *violaceo-fuscescens ; thorace fusco, utrinque linea longitudinali maculisque inferis argenteis ; alis virescentibus ; abdomine annulis sex argenteis ; pedibus atro-fuscis ; posticorum tibiis apicibusque albis.*

Habitat ad confluentem Tamalamequen in ripa Magdalenæ fluminis. (Regno Novogr.)

3. CULEX FEROX, *supra cæruleo aureoque varius, annulis quinque albis inferis ; alis virescentibus ; pedibus nigricanti-cæruleis, metallico-splendentibus ; posticis longissimis, basi apiceque niveis.*

Omnium maximus differt 1 a *C. hæmorrhoidali* Fab. cui pedes quoque cærulei, thorace superne cæruleo et auro maculato ; 2 a *C. cyanopenni* corpore superne cæruleo, pedibus haud annulatis, haud fuscis. An Nhatin Marcgr., p. 257 ?

Habitat ad ripam inundatam fluminis Guayaquilensis, prope San Borondon. (Regno Quitensi.)

4. CULEX CHLOROPTERUS, *viridis, annulis quinque albis ; alis virescentibus, pedibus fuscis ad basim subtus albis.*

The *culices* of South America have generally the wings, corselet, and legs of an azure colour, annulated, and variable from a mixture of spots of metallic lustre. Here, as in Europe, the males, which are distinguished by their feathered antennæ, are extremely rare; you are seldom stung except by females. The preponderance of this sex explains the immense increase of the species, each female laying several hundred eggs. In going up one of the great rivers of America, it is observed, that the appearance of a new species of *culex* denotes the proximity of a new stream flowing in. I shall mention an instance of this curious phenomenon. The *culex lineatus*, which belongs to the *canno* of Tamalamec, is only perceived in the valley of the Rio Grande de la Magdalena at a league north of the junction of the two rivers; it goes up, but scarcely ever descends the Rio Grande. It is thus, that, on a principal view, the appearance of a new substance in the gangue indicates to the miner the neighbourhood of a secondary vein, that joins the first.

On recapitulating the observations which we

Habitat cum præcedenti.

5. CULEX MACULATUS, *viridi-fuscescens, annulis octo albis, alis virescentibus, maculis tribus anticis, atro-cæruleis, auro immixtis; pedibus fuscis, basi alba.*

Habitat cum *c. feroce* et *c. chloroptero* in ripa fluminis Rio de Guayaquil propter *las Bodegas de Babaoyo.*

have here recorded, we see, that within the tropics, the moschettoes and *zancudoes* do not rise on the slope of the Cordilleras* toward the temperate region, where the mean heat is below 19° or 20° centigrade †; and that, with few exceptions, they shun the *black waters*, and dry and unwooded spots‡. The atmosphere swarms with them much more in the Upper, than in the Lower Oroonoko, because in the former the river is surrounded with thick forests on it's banks, and the skirts of the forests are not separated from the river by a barren and extensive beach. The moschettoes diminish on the New Continent with the

* The culex pipiens of Europe does not, like the culex of the torrid zone, shun mountainous places. Mr. Giesecke suffered from these insects in Greenland, at Disco, in latitude 70°. They are found in Lapland in summer, at three or four hundred toises high, and at a temperature of 11° or 12° cent. They give to the alpine region a character of movement and life, which Mr. Wahlenberg seems to regret that he did not find in the Alps of Switzerland, "*ubi culices apesque nullas choreas agunt.*" See the work of this traveller, *de Vegetatione et Clim. Helvet. septentr.* p. xxxv.

† Below 15·2° or 16° Reaumur. (This is the mean temperature of Montpellier and Rome.)

‡ Trifling modifications in the waters, or in the air, often appear to prevent the development of the moschettoes. Mr. Bowdich remarks, that there are none at Coomassie, in the kingdom of the Ashantees, though the town is surrounded by marshes, (*Mission to Ashantee*, 1819, p. 321,) and though the thermometer keeps up between seventeen and twenty-eight centesimal degrees, day and night (13·6° and 22·4° of Reaumur.)

diminution of the water, and the destruction of the woods; but the effects of these changes are as slow as the progress of cultivation. The towns of Angostura, Nueva Barcelona, and Mompox, where from the want of police, the streets, the great squares, and the interior of court-yards are covered with brush-wood*, are sadly celebrated for the abundance of zancudoes.

Men born in the country, whether they be whites, mulattoes, negroes, or Indians, all suffer from the sting of these insects. But, as cold does not render the north of Europe uninhabitable, so the moschettoes do not prevent men from dwelling in countries where they abound, if these countries, by their situation and government, afford resources for agriculture and industry. The inhabitants pass their lives in complaining *de la plaga, del insufrible tormento de las moscas;* yet, notwithstanding these continual complaints, they do not seek the less, and even with a sort of predilection, the commercial towns of Mompox, Santa Marta, and Rio la Hacha. Such is the force of habit in evils which we suffer every hour of the day, that the three missions of San Borja, Atures, and Esmeralda, where, to make use of an hyperbolical expression of the monks, there are more moschettoes

* With iatropha gossypifolia, scoparia, cleome, croton, & cassia.

than air*, would no doubt become flourishing towns, if the Oroonoko afforded planters the same advantages for the exchange of produce, as the Ohio and the Lower Missisippi. The abundance of venomous insects slackens, but does not stop entirely the progress of population; it prevents the whites from settling only in those places, where the commercial and political state of the country promise no real advantages.

I have indicated in another part of this work the curious fact, that the whites born in the torrid zone walk barefoot with impunity, in the same apartment where a European recently landed is exposed to the attack of the *niguas* or *chegoes* (*pulex penetrans*). These animals, almost invisible to the eye, get under the nails of the feet, and there acquire the size of a small pea by the quick increase of it's eggs, which are placed in a bag under the belly of the insect. The *nigua* therefore distinguishes what the most delicate chemical analysis could not distinguish, the cellular membrane and blood of a European from those of a creole white. It is not so with the moschettoes. These insects, whatever may be said on the coast of South America, attack equally the natives and the Europeans; it is only the effects of the sting, that are different in the two races of men. The same veno-

* *Mas moscos que ayre.*

mous liquid, deposited in the skin of a copper-coloured man of Indian race, and in that of a white man newly landed, causes no swelling to the former, while on the latter it produces hard blisters, greatly inflamed, and painful for several days; so different is the action of the dermoid system, according to the degree of irritability of the organs in different races, and different individuals!

I shall here recite several facts, which prove incontestibly, that the Indians, and in general all the people of colour, at the moment of being stung, suffer like the whites, although perhaps with less intensity of pain. In the day, even when labouring at the oar, the natives, in order to chase the insects, are continually giving one another smart slaps with the palm of the hand. Rude in all their movements, they strike themselves and their comrades mechanically during their sleep. The violence of their blows reminds us of the Persian tale * of the bear, that tried to kill with his paw the insects on the forehead of his sleeping master. Near Maypures we saw some young Indians seated in a circle and rubbing cruelly each others backs with the bark of trees dried at the fire. Indian women were occupied with a degree of patience, of which the copper-coloured race alone are capable, in extir-

* *Anvari Soheily*, book i, p. 64 (Calcutta, 1815).

pating by means of a sharp bone the little mass of coagulated blood, that forms the centre of every sting, and gives the skin a speckled appearance. One of the most barbarous nations of the Oroonoko, that of the Otomacs, is acquainted with the use of moschetto curtains (*mosquiteros*) formed of a tissue of fibres of the palm tree, *murichi*. We had lately seen, that at Higuerote, on the coast of Caraccas, the people of a copper colour sleep buried in the sand. In the villages of the Rio Magdalena the Indians often invited us to stretch ourselves with them on ox-skins, near the church, in the middle of the *plaza grande*, where they had assembled all the cows in the neighbourhood. The proximity of cattle gives some repose to man. The Indians of the Upper Oroonoko and the Cassiquiare, seeing that Mr. Bonpland could not prepare his herbal, on account of the continual torment of the moschettoes, invited him to enter their ovens (*hornitos*). Thus they call little chambers, without doors or windows, into which they creep horizontally through a very low opening. When they have driven away the insects by means of a fire of wet brush-wood, which emits a great deal of smoke, they close the opening of the oven. The absence of moschettoes is purchased dearly enough by the excessive heat of stagnant air, and the smoke of a torch of *copal*, which lights the oven during your stay in it. Mr.

Bonpland, with courage and patience well worthy of praise, dried hundreds of plants, shut up in these *hornitos* of the Indians.

The care which the Indians take to be less incommoded by the insects sufficiently proves, that, notwithstanding the different organization of the dermoid system, the copper-coloured man is sensible to the stings of insects, like the white man; but we here repeat, that the former seems to feel less pain, and the sting is not followed by those swellings, that succeed without interruption during several weeks, heighten the irritability of the skin, and throw persons of a delicate constitution into that feverish state, which always accompanies eruptive maladies. The whites born in equinoctial America, the Europeans who have long sojourned in the missions, on the borders of forests and great rivers, suffer much more than the Indians, but infinitely less than Europeans recently arrived. It is not therefore, as some travellers assert, the thickness of the skin, that renders the sting more or less painful at the moment when it is received; it is not on account of the particular organization of the integuments, that the Indians feel the sting less followed by swelling and inflammatory symptoms; it is on the nervous irritability of the dermoid system, that the acuteness and duration of the pain depend. This irritability is augmented by very warm clothing, by the

use of alcoholic liquors, by the habit of scratching the wounds, and lastly, and this physiological observation is the result of my own experience, that of baths taken at too short intervals. In places where the absence of crocodiles permits people to enter the river, Mr. Bonpland and myself observed, that the immoderate use of baths, while it moderated the pain of old stings of zancudoes, rendered us more sensible to new. By bathing more than twice a day, the skin is brought into a state of nervous irritability, of which no idea can be formed in Europe. It would seem as if all feeling were carried toward the integuments.

As the moschettoes and gnats pass two thirds of their lives in the water, we must not be surprised, that in the forests crossed by great rivers these noxious insects become more rare in proportion as you remove from the shore. They seem to prefer the spots where their metamorphosis took place, and where they go to deposit their eggs. In fact, the wild Indians (*Indios Monteros*) accustom themselves with so much more difficulty to the life of the missions, as they feel in the Christian establishments a torment, which they scarcely know in their own inland dwellings. The natives at Maypures, Atures, and Esmeralda, have been seen fleeing *al monte**, solely from the dread of moschettoes. Unfortu-

* "*To the woods.*"

nately, all the missions of the Oroonoko have been placed too near the banks of the river from the first. At Esmeralda the inhabitants assured us, that, if the village were placed in one of the five plains surrounding the high mountains of Duida and Maraguaca, they should breathe freely, and enjoy some repose. The *great cloud of moschettoes**, to use the expression of the monks, reposes only over the Oroonoko and it's tributary streams, and is dissipated in proportion as you remove from the rivers; so that we should form a very inaccurate idea of Guyana and Brazil, were we to judge of that great forest four hundred leagues wide, lying between the sources of the Madeira and the Lower Oroonoko, from the vallies of the rivers by which it is crossed.

I learnt, that the little insects of the family of the nemoceræ migrate from time to time like the alouat monkeys that live in society. In certain spots, at the commencement of the rainy season, different species appear, the sting of which had not yet been felt. We were informed at the Rio Magdalena, that at Simiti no other *culex* than the *jejen*† was formerly known; and the night was passed tranquilly, for the *jejen* is not a nocturnal insect. Since the

* "*La nube de Moscas.*"

† Or *xexen*.

year 1801, the great blue winged gnat (*culex cyanopterus*) has appeared in such numbers, that the poor inhabitants of Simiti know not how to procure a tranquil sleep. In the marshy channels *(esteros)* of the isle of Baru, near Carthagena, is found a little white fly, called *cafafi**. It is scarcely visible to the naked eye, and causes very painful swellings. The *toldos* or cottons used for moschetto curtains, must be wet, in order that the *cafafi* may not penetrate through the interstices left by the crossing threads. This insect, happily rare elsewhere, goes up, in January, by the channel or *dique* of Mahates, as far as Morales. When we went to this village in the month of May, we found there *simuliæ* and *zancudoes*, but no *jejens*.

Slight differences of food and climate appear to change, in the same species of moschettoes and gnats, the activity of the poison, which these animals distil from their sharp sucker, toothed at the lower end. The insects most troublesome at Oroonoko, or as the Creoles say, the most *ferocious* (*los mas feroces*), are those of the Great Cataracts of Esmeralda, and Mandavaca. On the Rio Magdalena the *culex cyanopterus* is dreaded, particularly at Mompox, Chilloa, and Tamalameca. At these places this insect is larger and stronger, and it's legs blacker.

* Perhaps of the section of *culiciform tipulæ*.

It is difficult not to smile at hearing the missionaries dispute on the size and voracity of the moschettoes at different parts of the same river. In the centre of a country ignorant of all that is passing in the rest of the world, this is the favourite subject of conversation. "How I pity your situation!" said the missionary of the raudales to the missionary of Cassiquiare, at our departure; "you are alone, like me, in this country of tigers and monkeys; with you fish is still more rare, and the heat more violent; but as for my flies, (*mia moscas*) I can boast, that with one of mine I would beat three of yours."

This voracity of insects in certain spots, the rage with which they attack man*, the activity of the venom varying in the same species, are very remarkable facts; which find their analogy however in the classes of large animals. The crocodile of Angostura pursues men, while at Nueva-Barcelona, in the Rio Neveri, you may bathe tranquilly in the midst of these carnivorous reptiles. The jaguars of Maturin, Cumanacoa, and the isthmus of Panama, are cowardly in

* This voracity, this appetite for blood, seems surprising in little insects, that live on vegetable juices, and in a country almost entirely uninhabited. "What would these animals eat, if we did not pass this way?" say the Creoles, in going through countries where there are only crocodiles covered with a scaly skin, and hairy monkeys.

comparison of those of the Upper Oroonoko. The Indians well know, that the monkeys of some valleys can easily be tamed, while others of the same species, caught elsewhere, will rather die of hunger, than submit to slavery*.

The common people in America have framed systems respecting the salubrity of climates and pathological phenomena, no less than the learned of Europe; and their systems, as with us, are diametrically opposite to each other, according to the provinces into which the new continent is divided. At the Rio Magdalena the frequency of moschettoes is regarded as troublesome, but salutary. These animals, say the inhabitants, give us slight bleedings, and preserve us, in a country excessively hot, from the *tabardillo*, scarlet fever, and other inflammatory diseases. At the Oroonoko, the banks of which are very dangerous to health, the sick accuse the *moschettoes* of all the evils they experience. "These

* I might have added the example of the scorpion of Cumana, which it is very difficult to distinguish from that of the island of Trinidad, Jamaica, Carthagena, and Guayaquil; yet the former is not more to be feared than the *scorpio europæus* (of the south of France), while the latter produces consequences far more alarming than the *scorpio occitanus* (of Spain and Barbary). At Carthagena and Guayaquil, the sting of the scorpion (*alacran*) instantly causes the loss of speech. Sometimes a singular torpor of the tongue is observed for fifteen or sixteen hours. The patient, when stung in the legs, stammers as if he had been struck with apoplexy.

insects are born of corruption, and increase it; they vitiate and inflame the blood *(vician y encienden la sangre)*." It would be useless here to refute the popular belief, that considers the action of the moschettoes as salutary by it's local bleedings. Even in Europe the inhabitants of marshy countries are not ignorant, that the insects irritate the dermoid system, and stimulate it's functions by the venom, which they deposit in the wounds they make. Far from diminishing the inflammatory state of the integuments, the stings increase it.

The frequency of gnats and moschettoes characterizes unhealthy climates only so far as the development and multiplication of these insects depend on the same causes, that give rise to miasmata. These noxious animals love a fertile soil covered with plants, stagnant waters, and a humid air never agitated by the wind; they prefer to an open country those shades, that softened day, that tempered degree of light, caloric, and humidity, which, while it favors the action of chemical affinities, accelerates the putrefaction of organized substances. Do the moschettoes themselves increase the insalubrity of the atmosphere? When we reflect, that to the height of three or four toises a cubic foot of air is often peopled by a million of winged insects*, which

* It is sufficient to mention on this occasion, that the cubic foot contains 2,985,984 cubic lines.

contain a caustic and venomous liquid; when we recollect, that several species of the *culex*† are 1·8 line long from the head to the extremity of the corselet (without reckoning the legs); lastly, when we consider, that in this swarm of moschettoes and gnats, diffused in the atmosphere like smoke, there is a great number of dead insects, raised by the force of the ascending current, or by that of the lateral currents, which are caused by the unequal heating of the soil; we are led to inquire, whether the presence of so many animal substances in the air must not occasion particular miasmata. I think, that these substances act on the atmosphere differently from sand and dust; but it will be prudent, to affirm nothing on this subject. Chemistry has not yet unveiled any of the numerous mysteries of the insalubrity of the air; it has only taught us, that we are ignorant of many things, with which fifteen years ago we believed we were acquainted, thanks to the ingenious dreams of ancient eudiometry.

What is less uncertain, and in some sort confirmed by daily experience, is, that at the Oroonoko, Cassiquiare, Rio Caura, and wherever the air is very unhealthy, the sting of the moschettoes augments the disposition of the organs to

† For instance, the species which I have named *culex cyanopterus*.

receive the impression of miasmata. When you are exposed day and night during whole months to the torment of insects, the continual irritation of the skin causes febrile commotions; and, from the counteraction so anciently recognised between the dermoid and the gastric systems, injures the functions of the stomach. Digestion first becomes difficult; the cutaneous inflammation excites profuse sweats; a thirst not to be quenched succeeds; and, in persons of a feeble constitution, increasing impatience is succeeded by a depression of mind, during which all the *pathogenic* causes act with violence. It is now neither the dangers of a navigation in small boats, the savage Indians, nor the serpents, crocodiles, or jaguars, that make the Spaniards dread a voyage on the Oroonoko; it is, as they say with simplicity, "*el sudar y las moscas*, the sweatings and the flies." Let us hope, that man, in changing the surface of the soil, will succeed in altering by degrees the constitution of the atmosphere. The insects will diminish, when the old trees of the forest have disappeared; and when in those now desert countries the rivers are seen bordered with cottages, and the plains covered with pastures and harvests.

Whoever has lived long in countries infested by *moschettoes* will have felt like us, that there exists no radical cure for the torment of these insects. The Indians, covered with anotta, bolar

earth, or turtle oil, give themselves smart slaps every instant with the palm of their hands, on the shoulders, the back, and the legs, nearly as if their bodies were not *painted*. It is doubtful, whether in general the *painting* relieve, certainly it does not prevent the evil. Europeans, recently arrived at the Oroonoko, the Rio Magdalena, the river Guayaquil, or Rio Chagre (I mention the four rivers where the insects are most to be dreaded) cover at first the face and hands; they soon feel a heat difficult to endure, are weary of being condemned to complete inactivity, and finish with leaving the face and hands uncovered. Persons, who would renounce all kind of occupation during the navigation of these rivers, might bring some particular garment from Europe in the form of a bag, under which they could remain covered, opening it only every half-hour. This bag should be distended by whalebone hoops, for a simple mask and gloves would be scarcely supportable. Sleeping on the ground, on skins or in hammocks, we could not make use of the moschetto curtains (*toldos*) at the Oroonoko. The *toldo* is useful only where it forms a tent so well closed around the bed, that there is not the smallest opening, by which a gnat can pass. This is difficult to accomplish; and often when you succeed (for instance, in going up the Rio Magdalana, where you travel with some degree of convenience), you are

forced, in order to avoid being suffocated by the heat, to come out from beneath your *toldo*, and walk about in the open air. A feeble wind, smoke, and powerful smells, scarcely afford any relief in places, where the insects are very numerous, and very voracious. It is erroneously affirmed, that these little animals fly from the peculiar smell emitted by the crocodile. We were horribly stung at Bataillez, in the road from Carthagena to Honda, while we were dissecting a crocodilo eleven feet long, the smell of which infested all the surrounding atmosphere. The Indians much commend the fumes of burnt cowdung. When the wind is very strong, and accompanied by rain, the moschettoes disappear for some time; they sting most cruelly at the approach of a storm, particularly when the electric explosions are not followed by heavy showers.

Any thing waving about the head and the hands contributes to chase away the insects. "The more you stir yourself, the less you will be stung," say the missionaries. The *zancudo* makes a buzzing before it settles; but, when it has assumed confidence, when it has once begun to fix it's sucker, and swell with sucking, you may touch it's wings without it's being frightened. It remains the whole time with it's two hind legs raised in the air; and, if it be left to suck to satiety undisturbed, no swelling takes

place, and no pain is left behind. We often repeated this experiment on ourselves in the valley of the Rio Magdalena, by the advice of the natives. It may be asked, whether the insect deposit the stimulating liquid only at the moment of it's flight, when it is driven away, or repump the liquid, when it is left to suck as much as it will. I incline to this latter opinion; for on presenting quietly the back of the hand to the *culex cyanopterus*, I observed, that the pain, very violent in the beginning, diminishes in proportion as the insect continues to suck; and ceases altogether, when it voluntarily flies away. I also tried to wound my skin with a pin, and rubbed the pricks with bruised moschettoes (*mosquitos machucados*); and no swelling ensued. The irritating liquor of the dipteræ nemoceræ, in which the chemists have not yet recognized any acid properties, is contained as in the ant, and other hymenopterous insects, in particular glands; and is probably too much diluted, and consequently too much weakened, if the skin be rubbed with the whole of the bruised insect.

I have united at the close of this chapter all we learned during the course of our travels on phenomena, which naturalists have singularly neglected hitherto, though they exert a great influence on the welfare of the inhabitants, the salubrity of the climate, and the establishment of new colonies on the rivers of equinoctial

America. I would not attempt to justify myself for having treated this object in details that might appear too minute, if they were not connected with general physiological views. Our imagination is struck only by what is great; but it belongs to the philosophy of nature, to pause at what is little. We have just seen, that winged insects, collected in society, and concealing in their sucker a liquid that irritates the skin, are capable of rendering vast countries almost uninhabitable. Other insects equally small, the termites (*comejen*) create obstacles to the progress of civilization in several hot and temperate parts of the equinoctial zone, that are difficult to be surmounted. They devour paper, pasteboard, parchment, with frightful rapidity, destroying records and libraries. Whole provinces of Spanish America do not afford one written document, that dates a hundred years back. What improvement can the civilization of nations acquire, if nothing link the present with the past, if the depositaries of human knowledge must be repeatedly renewed, if the records of genius and reason cannot be transmitted to posterity?

In proportion as you ascend the tableland of the Andes, these evils disappear. Man breathes a fresh and pure air. The insects no more disturb the labors of the day, or the slumbers of the night. Documents can be collected in archives

without our having to complain of the voracity of the termites. The moschettoes are no longer feared at two hundred toises of height; and the termites, still very frequent at three hundred toises of elevation,* become very rare at Mexico, Santa Fe de Bogota, and Quito. In these great capitals, situate on the back of the Cordilleras, we find libraries and archives, that the enlightened zeal of the inhabitants augments from day to day. These circumstances, which I here only indicate, are combined with others, that insure a moral preponderance to the Alpine region over the lower regions of the torrid zone. If we admit, agreeably to the ancient traditions collected in both the old and new worlds, that at the time of the catastrophe, which preceded the renewal of our species, man descended from the mountains into the plains, we may admit with still greater confidence, that these mountains, the cradle of so many various nations, will for ever remain the centre of human civilization in the torrid zone. From their fertile and temperate table-lands, from these islets scattered in the aërial ocean, knowledge, and the blessings of social institutions will be spread over the

* There are some at Popayan, (height 910 t.; mean temperature 18·7° cent.) but they are species that gnaw wood only.

vast forests, that extend at the foot of the Andes, and are inhabited in our days by tribes, whom the very wealth of nature has retained in indolence.

CHAPTER XXI.

Raudal of Garcita.—Maypures.—Cataracts of Quittuna.—Mouth of the Vichada and Zama.—Rock of Aricagua.—Siquita.

We went to rejoin our boat in the *Puerto de Arriba*, above the cataract of Atures, opposite the mouth of the Rio Cataniapo. In the narrow path, that leads to the *embarcadero*, we beheld for the last time the peak of Uniana. It appeared like a cloud rising above the horizon of the plains. The Guahiboes wander at the foot of the mountains, and extend their course as far as the banks of the Vichada. We were shown at a distance, on the right of the river, the rocks that surround the cavern of Ataruipe; but we had not time to visit that cemetery of the destroyed tribe of the Atures. We regretted this so much the more, as father Zea was never weary of talking to us of the skeletons painted with anotta, which this cavern contained; of

the large vases of baked earth, in which the bones of separate families appeared to be collected; and of many other curious objects, which we proposed to examine at our return from the Rio Negro. "You will scarcely believe," said the missionary, "that these skeletons, these painted vases, things which we believed were unknown to the rest of the world, have brought trouble upon me and my neighbour, the missionary of Carichana. You have seen the misery in which I live in the *raudales*. Devoured by moschettoes, and often in want of plantains and cassava, I have found envious people even in this country! A white man who inhabits the pastures between the Meta and the Apure, denounced me recently in the *Audiencia* of Caraccas, as concealing a treasure I had discovered jointly with the missionary of Carichana amid the tombs of the Indians. It is asserted, that the jesuits of Santa Fe de Bogota were apprised beforehand of the destruction of their company; and that, in order to save the riches they possessed in money and precious vases, they sent them either by the Rio Meta, or the Vichada, to the Oroonoko, with orders to have them hidden in the islets amid the *raudales*. These are the treasures, which I am supposed to have appropriated unknown to my superiors. The *Audiencia* of Caraccas brought a complaint before the governor of Guayana, and we were or-

dered to appear in person. We took a useless journey of one hundred and fifty leagues ; and although we declared, that we had found in the caverns only human bones, and dried bats and polecats, commissioners were gravely nominated to come hither, and inspect on the spot what remains of the treasures of the jesuits. We shall wait a long time for these commissioners. When they have gone up the Oroonoko as far as San Borja, the fear of the moschettoes will prevent them from going farther. The cloud of flies (*nube de moscas*), which envelops us in the *raudals*, is a good defence."

The account given by the missionary was entirely conformable to what we afterward learned at Angostura from the mouth of the governor. Fortuitous circumstances had given rise to the strangest suspicions. In the caverns, where the mummies and skeletons of the nation of the Atures are found, even in the midst of the cataracts, and in the most inaccessible islets, the Indians long ago discovered boxes bound with iron, containing various European tools, remnants of clothes, rosaries, and glass trinkets. These objects are thought to have belonged to Portugueze traders of the Rio Negro and Grand Para, who, before the establishment of the jesuits on the banks of the Oroonoko, went up to Atures by *portages* and the interior communications of rivers, in order to traffic

with the natives. It is supposed, that these Portugueze sunk beneath the epidemic maladies so common in the *raudales*, and that their trunks became the property of the Indians, the wealthiest of whom are accustomed to cause themselves to be buried with all they possessed most valuable during their lives. From these very uncertain traditions the tale of a hidden treasure has been fabricated. As in the Andes of Quito every ruined building, without excepting the foundations of the pyramids erected by the French academicians for the measurement of the meridian, is regarded as *Inga pilca**, that is, the work of the Inca; so at Oroonoko every hidden treasure can belong only to an order, which, no doubt, governed the missions better than the capuchins and the monks of the Observance, but of which the riches and success in the civilization of the Indians have been much exaggerated. When the jesuits of Santa Fe were arrested, those heaps of piastres, those emeralds of Muzo, those bars of gold of Choco, which the enemies of the company supposed they possessed, were not found in their dwellings. Still it was wrong to conclude from this, that the treasures did not the less exist; but that, entrusted to faithful Indians, they had been hidden amid the cataracts of the Oroonoko, to be recovered at some future day,

* *Pilca* (properly in Quichua *pirca*), wall of the Inca.

when the company should be reestablished. I can cite a respectable testimony, which proves incontestibly, that the viceroy of New Grenada had not warned the jesuits of Santa Fe of the danger, with which they were menaced. Don Vicente Orosco, officer of engineers in the service of the King of Spain, related to me, that being arrived at Angostura, jointly with Don Manuel Centurion*, to arrest the Missionaries of Carichana, he met an Indian boat, that was going down the Rio Meta. The boat being manned with Indians, who could speak none of the tongues of the country, gave rise to suspicions. After useless researches, a bottle was at length discovered, containing a letter, in which the superiors of the company, residing at Santa Fe, informed the missionaries of the Oroonoko of the persecutions, to which the jesuits were exposed in New Grenada. This letter recommended no measure of precaution; it was short, without ambiguity, and respectful toward the government, whose orders were executed with useless and unreasonable severity.

Eight Indians of Atures had conducted our boat through the *raudals;* and seemed well satisfied with the slight retribution we gave them†. They gain little by this employment; and in order to give a just idea of the poverty

* The same who was governor of Guyana till 1777.

† Scarcely a franc and a half for each man.

and want of commerce in the missions of the Oroonoko, I shall observe, that during three years, with the exception of the boats sent annually to Angostura by the commander of San Carlos du Rio Negro, to fetch the pay of the soldiers, the missionary had seen but five canoes of the Upper Oroonoko pass the cataract, which were bound for the harvest of turtles' eggs, and eight boats laden with merchandize.

April the 17th. After three hours' march, we reached our boat about eleven in the morning. Father Zea caused to be embarked, with our instruments, the small store of provision, that he had been able to procure for the voyage, which he was going to continue with us; they consisted of a few bunches of plantains, some cassava, and fowls. At the *embarcadero* we immediately passed the mouth of the Cataniapo*, a small river, the banks of which, at three days' journey distance, are inhabited by the Macoes, or Piaroas, who belong to the great family of the Saliva nations. We have had occasion above, to praise their mildness, and their disposition for agricultural labours†.

Beside the Piaroas of Cataniapo, who pierce their ears in order to place in them the teeth of caimans and pecaris, three other tribes of Ma-

* Cateniapu, or Catiniapo.

† See p. 15, of this volume.

coes are known; one, on the Ventuari, above the Rio Mariata*; the second, on the Padamo, north of the mountains of Maraguaca; and the third, near the Guahariboes, toward the sources of the Oroonoko, above the Rio Gehette. This last tribe bears the name of Maco-Macoes. I collected the following words from a young Maco of the banks of the Cataniapo, whom we met near the *embarcadero*, and who wore in his ears, instead of a tusk of the pecari, a large wooden cylinder†. I shall here transcribe the words, because they are not found among the materials, which I communicated to Mr. Vater, the learned author of Mithridates.

Plantain, *Paruru*, (in Tamanac also, *paruru*).
Cassava, *Elente*, (in Maco, *cahig*).
Maize, *Niarne*.
The Sun, *Jama*, (in Saliva, *mumeseque cocco*).
The Moon, *Jama* (in Saliva, *vexio*).
Water, *Ahia* (in Saliva, *cagua*).
One, *Nianti*.
Two, *Tajus*.
Three, *Percotahuja*.
Four, *Imontegroa*.

* The Piaroas or Piraoas of the Ventuari were visited by father Forneri, a jesuit.

† This custom is observed among the Cabres, the Maypures, and the Pevas of the Amazon. These last, described by Mr. de la Condamine, stretch their ears by weights of a considerable size.

The young man could not reckon as far as five, which certainly is no proof, that the word five does not exist in the Maco tongue. I know not whether this tongue be a dialect of the Saliva, as is pretty generally asserted; for the idioms, that are derived from one another, sometimes furnish words utterly different for the most common and most important things*. But in discussions on mother-tongues and derivative languages, it is not the sounds, the roots only, that are decisive; but rather the interior structure, and the grammatical forms. In the American idioms, which are notwithstanding rich, the Moon is commonly enough called the *Sun of night*, or even the *Sun of sleep*; but the Moon and Sun very rarely bear the same name, as among the Macoes. I know only a few examples in the most northerly part of America, among the Woccons, the Chippeways, the Muskogulges, and the Mohawks†. Our missionary asserted, that *jama*, in Maco, indicated at the same time the Supreme Being, and the great orbs of night and day; while many other American tongues, for instance the Tamanack, and the Caribbee,

* The great family of the Esthonian (or Tschoude) languages, and of the Samojede languages, affords numerous examples of these differences.

† Nipia-kisathwa in the Shawanese (the idiom of Canada), from *nippi*, to sleep, and *kisathwa*, the Sun.

have distinct words to denote God, the Moon, and the Sun. We shall soon see how much the missionaries of the Oroonoko are afraid of employing, in their translations of the prayers of the church, the native words, which denote the Divinity, the Creator (*Amanene*), the Great Spirit who animates all nature. They choose rather to *Indianize* the Spanish word *Dios*, converting it, according to the differences of pronunciation, and the genius of the tongues, in to *Diosi*, *Tiosu*, or *Piosu*.

Again embarked on the Oroonoko, we found the river free from shoals; and after a few hours passed the *raudal* of Garcita, the rapids of which are easy to go up, when the waters are high. A small chain of mountains is seen to the east, that of Cumadaminari, which consists of gneiss, and not of stratified granite. We were struck with a succession of great holes, which are perceived at more than one hundred and eighty feet above the present level of the Oroonoko, and which notwithstanding appear to be the effects of the erosion of the waters. We shall see hereafter, that this phenomenon occurs again nearly at the same height, both in the rocks that border the cataracts of Maypures, and fifty leagues to the east, near the mouth of the Rio Jao. We slept in the open air, on the left bank of the river, below the island of Tomo. The night was beautiful and serene, but the stratum of mos-

chettoes was so thick near the ground, that I could not succeed in levelling the *artificial horizon*; consequently, I lost the opportunity of observing the stars. Had I been furnished with an *horizon of mercury* on this voyage, it would have been of great use to me.

April the 18th. We set out at three in the morning, in order to be more sure of arriving before the close of day at the cataract known by the name of the *Raudal des Guahibos*. We stopped at the mouth of the Rio Tomo. The Indians went on shore, to prepare their food, and take some repose. When we reached the foot of the *raudal*, it was near five in the afternoon. It was extremely difficult to go up the current and struggle against a mass of water, which is precipitated from a bank of gneiss several feet high. An Indian threw himself into the water, to reach by swimming the rock, that divides the cataract into two parts. A rope was fastened to the point of this rock, and when the canoe was hauled near enough, our instruments, our dry plants, and the little provision we had collected at Atures, were landed in the *raudal* itself. We remarked with surprise, that the natural dam, over which the river is precipitated, furnishes a dry space of considerable extent; where we stopped to see the boat go up.

The rock of gneiss exhibits circular holes, the

largest of which are four feet deep, and eighteen inches wide. These funnels contain quartz, pebbles, and appear to be formed by the friction of masses rolled along, and subjected to the impulse of the waters. Our situation, in the midst of the cataract, was singular enough, though without presenting the smallest danger. The missionary, who accompanied us, had his fever fit on him. In order to quench the thirst by which he was tormented, the idea suggested itself to us of preparing a refreshing beverage for him in one of the excavations of the rock. We had taken in at Atures a *mapire** filled with sugar, limes, and those *grenadillas*, or fruits of the passion-flower, called *parchas* by the Spaniards. As we were absolutely destitute of large vessels, to contain and mix liquids, we poured, by means of a *tutuma* (fruit of *crescentia cujete*, calabash), the water of the river into one of the holes of the rock. To this we added sugar, and the juice of acid fruits. In a few minutes we had an excellent beverage, which was almost a refinement of luxury in that wild spot; but the sensation of our wants rendered us every day more industrious.

Having quenched our thirst, we felt a great desire to bathe. On examining attentively the narrow and rocky dike, on which we were sta-

* Indian basket.

tioned, we perceived, that in it's upper part it formed small nooks, where the water was still and limpid. We had the pleasure of bathing tranquilly amid the noise of the cataract, and the cries of our Indians. I enter into these minute details, because, while they furnish a lively picture of our manner of travelling, they remind those who wish to undertake distant journeys, that in every situation of life some enjoyments may be obtained.

After an hour of expectation, we at length saw the boat arrive above the *raudal.* We reembarked our instruments and provision, and hastened to quit the rock of Guahibos. There began a navigation, which was not exempt from danger. The river is eight hundred toises broad, and must be crossed obliquely, above the cataract, at the point where the waters, led by the slope of their bed, rush with extreme violence toward the dam, from which they are precipitated. We were surprised by a storm, accompanied happily by no wind, but the rain fell in torrents. After rowing for twenty minutes, the pilot declared, that, far from gaining upon the current, we again approached the *raudal.* These moments of uncertainty appeared to us very long; the Indians spoke only in whispers, as they do always when they think their situation perilous. They redoubled their efforts, and we

arrived at nightfall, without any accident, in the port of Maypures.

Storms within the tropics are as short as violent. The lightning had fallen twice near our boat, and had no doubt struck the surface of the water. I mention this phenomenon, because it is pretty generally believed in those countries, that the clouds, the surface of which is charged with electricity, are at so great a height, that the lightning reaches the ground more rarely than in Europe. The night was extremely dark, and a journey of two hours remained, before we could reach the village of Maypures. We were wet to the skin. In proportion as the rain ceased, the *zancudoes* reappeared, with that voracity which the *tipulary* insects always display immediately after a storm. My fellow-travellers were uncertain, whether we ought to take our station in the port, or proceed on our way on foot, in spite of the darkness of the night. Father Zea, who is the missionary of the two *raudals*, was determined to reach his home. He had caused the construction of a large house of two stories, to be begun by the Indians of the mission. "You will there find," said be with simplicity, "the same conveniences as in the open air; I have not a bench, not a table, but you will not suffer so much from the flies, which are less troublesome in the mission, than on the banks of the river."

We followed the counsel of the missionary. He caused *torches of copal* to be lighted, of which we have spoken above. They are tubes made of bark of trees three inches in diameter, and filled with this resin. We walked at first on beds of rock, that were bare and slippery, and then entered a thick grove of palm-trees. We were twice obliged to pass a stream on trunks of trees hewn down. The torches had already gone out. Being formed on a strange principle, the ligneous wick surrounding the resin, these torches yield more smoke than light, and are easily extinguished. Our fellow-traveller, Don Nicolas Soto, lost his balance in crossing the marsh on a round trunk. We were at first very uneasy on his account, not knowing from what height he had fallen; but happily the gully was not deep, and he received no hurt. The Indian pilot, who expressed himself with some facility in the Spanish, did not fail to talk to us of snakes, water-serpents, and tigers, by which we might be attacked. Such conversations are matters of course, when you travel at night with the natives. By intimidating the European traveller, the Indians believe, that they shall render themselves more necessary, and gain the confidence of the stranger. The rudest inhabitant of the missions understands the deceptions, which every where arise from the relations between men of unequal fortune and civiliza-

tion. Under the absolute and sometimes vexatious government of the monks, he seeks to meliorate his condition by those little artifices, which are the weapons of childhood, and of all physical and intellectual weakness.

Having arrived during the night at *San Jose de Maypures*, we were forcibly struck by the aspect and solitude of the place; the Indians were plunged in profound sleep, and nothing was heard but the cries of nocturnal birds, and the distant sound of the cataract. In the calm of the night, amid the deep repose of nature, the monotonous sound of a fall of water has something in it sad and solemn. We remained three days at Maypures, a small village founded by Don Jose Solano at the time of the expedition of the boundaries, the situation of which is more picturesque, it might be said still more admirable, than that of Atures.

The *raudal* of Maypures, called by the Indians Quittuna, is formed, as all cataracts are, by the resistance which the river finds in it's way across a ridge of rocks, or a chain of mountains. The nature of this scene may be studied by examining the plan, which I sketched on the spot, to show the Governor-General of Caraccas the possibility of avoiding the *raudal*, and of facilitating the navigation, by digging a canal between two tributary streams of the Oroonoko, in a valley that appears to have been

heretofore the bed of the river*. The lofty mountains of Cunavami and Calitamini, between the sources of the rivers Cataniapo and Ventuari, stretch toward the west in a chain of granitic hills. From this chain flow three small rivers, which embrace in some sort the cataract of Maypures. There are, on the eastern bank, the Sanariapo, and on the western, the Cameji and the Toparo. Opposite the village of Maypures, the mountains fall back in an arch, and, like a rocky coast, form a gulf open to the south-east. The irruption of the river is effected between the mouths of the Toparo and the Sanariapo, at the western extremity of this majestic amphitheatre.

The Oroonoko now rolls it's waters at the foot of the eastern chain of the mountains. It has abandoned the ground to the west, where, in a deep valley, the ancient shore is easily recognized. A savannah, scarcely raised thirty feet above the mean level of the waters, extends from this desiccated valley as far as the cataracts. There the small church of Maypures has been constructed with trunks of palm-trees, and is surrounded by seven or eight huts. The dried valley, which runs in a straight line from south to north, from Cameji to Toparo, is filled with

* See the plan of the *raudal*, in my itinerary chart of the Oroonoko (Geographical Atlas, pl. 16).

granitic and solitary mounds, all resembling those, which are found in the shape of islands and shoals in the present bed of the river. I was struck with this analogy of form, on comparing the rocks Keri and Oco, situate in the deserted bed of the river, west of Maypures, with the islets of Ouivitari and Caminitamini, which rise like old castles amid the cataracts to the east of the mission. The geological aspect of these scenes, the insulary form of the elevations farthest from the present shore of the Orqonoko, the cavities which the waves appear to have hollowed in the rock Oco, and which are precisely on the same level (25 or 30 toises high) as the excavations perceived opposite to them in the isle of Ouivitari; these united appearances prove, that the whole of this bay, now dry, was formerly covered by the waters. Those waters probably formed a lake, the northern dike preventing their running out: but, when this dike was broken down, the savannah, that surrounds the mission, appeared at first like a very low island, bounded by two arms of the same river. It may be supposed, that the Oroonoko continued for some time to fill the ravin, which we shall call the valley of Keri, because it contains the rock of this name; and that the waters retired wholly toward the eastern chain, leaving dry the western arm of the river, only as they gradually diminished. Coloured stripes,

which no doubt owe their black tint to the oxyds of iron and manganese, seem to prove the justness of this conjecture. They are found on all the stones, far from the mission, and indicate the ancient abode of the waters. In going up the river, the merchandize is discharged at the confluence of the Rio Toparo and the Oroonoko. The boats are entrusted to the natives, who have so perfect a knowledge of the *raudal*, that they have a particular name for every step. They conduct the boats as far as the mouth of the Cameji, where the danger is considered as past.

The following is the state of the cataract of Quittuna or Maypures, at the two periods when I examined it, in going down and up the river. It is formed, like that of Mapara or Atures, by an archipelago of islands, which to the length of three thousand toises fill the bed of the river, and by rocky dikes, which join the islands together. The most famous of these dikes, or natural dams, are *Purimarimi*, *Manimi*, and the *Leap of the Sardina**. I name them in the order, in which I saw them in succession from south to north. The last of these three stages is near nine feet high, and forms by it's breadth a magnificent cascade. I must here repeat however, that the turbulent shock of the precipitated and broken waters does not so much depend on the absolute height of each step,

* *Salto de la Sardina.*

each transverse dike, as upon the multitude of counter-currents, the grouping of the islands and shoals, that lie at the foot of the *raudalitos* or partial cascades, and the contraction of the channels, which often do not leave the navigation a free passage of twenty or thirty feet. The eastern part of the cataract of Maypures is much more dangerous than the western; and therefore the Indian pilots prefer the left bank of the river, to conduct the boats down or up. Unfortunately, in the season of low waters, this bank remains partly dry, and recourse must be had to the process of *portage**; that is, the boats are obliged to be dragged on cylinders, or round logs. We have already observed above, that at the season of high waters in the Oroonoko, but then only, the *raudal* of Maypures is easier to pass than the *raudal* of *Atures*.

To take in at one view the grand character of these stupendous scenes, the spectator must be stationed on the little mountain of Manimi, a granitic ridge, that rises from the savannah, north of the church of the mission, and is itself only a continuation of the steps, of which the *raudalito* of Manimi is composed. We often visited this mountain, for we were never weary of the view of this astonishing spectacle, concealed in one of the most remote corners of the Earth.

* *Arastrar la Piragua.*

Arrived at the summit of the rock, the eye suddenly takes in a sheet of foam, extending a whole mile. Enormous masses of stone, black as iron, issue from it's bosom. Some are paps grouped in pairs, like basaltic hills ; others resemble towers, strong castles, and ruined buildings. Their gloomy tint contrasts with the silvery splendour of the foam. Every rock, every islet is covered with vigorous trees, collected in clusters. At the foot of those paps, far as the eye can reach, a thick vapour is suspended over the river, and through this whitish fog the tops of the lofty palm-trees shoot up. What name shall we give to these majestic plants? I suppose them to be the *vadgiai*, a new species of the genus oreodoxa, the trunk of which is more than eighty feet high. The leafy plume of this palm-tree had a brilliant lustre, and rises almost straight toward the sky. At every hour of the day the sheet of foam displays different aspects. Sometimes the hilly islands and the palm-trees project their broad shadows, sometimes the rays of the setting sun are refracted in the humid cloud, that shrouds the cataract. Coloured arcs are formed, and vanish and appear again alternately; light sport of the air, their images wave above the plain.

Such is the character of the landscape discovered from the top of the mountain of Manimi, which no traveller has yet described. I do not hesitate to repeat, that neither time, nor the view

of the Cordilleras, nor any abode in the temperate vallies of Mexico, have effaced from my mind the powerful impression of the aspect of the cataracts. When I read a description of those places in India, that are embellished by running waters and a vigorous vegetation, my imagination retraces a sea of foam and palm-trees, the tops of which rise above a stratum of vapour. The majestic scenes of nature, like the sublime works of poetry and the arts, leave remembrances that are incessantly awakening, and through the whole of life mingle with all our feelings of what is grand and beautiful.

The calm of the atmosphere, and the tumultuous movement of the waters, produce a contrast peculiar to this zone. Here no breath of wind ever agitates the foliage, no cloud veils the splendour of the azure vault of Heaven; a great mass of light is diffused in the air, or the earth strewn with plants with glossy leaves, and on the bed of the river, which extends far as the eye can reach. This appearance surprises the traveller born in the north of Europe. The idea of wild scenery, of a torrent rushing from rock to rock, is linked in his imagination with that of a climate, where the noise of the tempest is mingled with the sound of the cataracts; and where in a gloomy and misty day, sweeping clouds seem to descend into the valley, and rest upon the tops of the pines. The landscape of

the tropics in the low regions of the continents has a peculiar physiognomy, something of greatness and repose, which it preserves even where one of the elements is struggling with invincible obstacles. Near the equator, hurricanes and tempests belong to islands only, to deserts destitute of plants, and to those spots, where parts of the atmosphere repose upon surfaces, from which the radiation of heat is very different.

The mountain of Manimi forms the eastern limit of a plain, which furnishes for the history of vegetation, that is, for it's progressive development in bare and desert places, the same phenomena, which we have described above in speaking of the *raudal* of Atures. During the rainy season, the waters heap vegetable earth upon the granitic rock, the bare shelves of which extend horizontally. These islands of mould, decorated with the most beautiful * and most

* The vegetation of Maypures is characterized by the following plants, most of which have already been published by Messrs. Bonpland and Kunth, in the *Nova Gen. et Spec. Plantarum.* Jacaranda *obtusifolia*, *ancistrocarpus maypurensis*, nona *xyluopioides*, euphorbia *tenella*, peperomia *maypuriensis*, pothos *augustatus*, smilax *maypurensis*, oplismenus *polystachius*, poa *maypuriensis*, eryocaulon *umbellatum*, psidium *phylliroides* (the fruit of which is employed by the Indians for refreshing lemonades), oenothera *maypuriensis*, passiflora *auriculata*, solanum *platyphyllum*, aristolochia *nummularifolia*, melastoma insectifera. The pine-apples, which grow in the savannahs near Atures, have an exquisite flavour.

odoriferous plants, resemble the blocks of granite covered with flowers, which the inhabitants of the Alps call *gardens* or *courtils*, and which pierce the glaciers of Savoy. In the midst of the cataracts, on shelves difficult of access, the vanilla vegetates. Mr. Bonpland gathered there very aromatic pods of an extraordinary length.

In a place where we had bathed the day before, at the foot of the rock of Manimi, the Indians killed a serpent seven feet and half long, which we were able to examine at our ease. The Macoes called it *camudu**. It's back displayed upon a yellow ground transverse bands, partly black, and partly inclining to a brown-green: under the belly the bands were blue, and united in rhomboid spots. It was a fine animal, not venomous, and which, the natives say, attains more than fifteen feet in length. I thought at first, that the *camudu* was a *boa*; but I saw with surprise, that the scales beneath the tail were divided into two rows. It was therefore a viper, *coluber*; perhaps a *python* of the New Continent: I say perhaps, for great naturalists † appear to admit, that all the pythons belong to the ancient, and all the boas to the New World. As the boa of Pliny ‡ was a serpent of Africa and

* *Camudu*, scutis ventralibus 168, subcaudalibus duplici serie dispositis 75.

† *Cuvier, Regne Animal*, vol. ii, p. 66, 69, 71.

‡ Was it the coluber elaphis, or the coluber Æsculapii, or

of the south of Europe, it were to be wished, that Mr Daudin had named the boas of America, pythons, and the pythons of India, boas. The first notions of an enormous reptile, that seizes man, and even the great quadrupeds, breaks their bones by twisting itself round their bodies, and swallows goats and kids, came to us from India and the coast of Guinea. However indifferent names may be, we can scarcely admit the idea, that the hemisphere, in which Virgil sung the torments of Laocoon, a fable which the Greeks of Asia borrowed from much more southern nations, does not possess the *boa constrictor*. I will not augment the confusion of zoological nomenclature by proposing new changes, and shall confine myself to observing, that at least the missionaries, and the *latinized* Indians of the missions*, if not the vulgar among the planters of Guyana, clearly distinguish the *traga-venados* (*devins*, real boas, with simple anal plates,) from the *culebras de agua*†, water-snakes, like the camudu (pythons with double anal scales). The *traga-venados* have no transverse bands on the back, but a chain of rhomboid or hexagonal spots. Some species prefer the dryest

a python, like that killed by the army of Regulus? (Cuvier, *Reg. anim.*, vol. ii, p. 65.)

* See vol. iii, p. 239.

† The great python of Java is also called *ular sawa*, which means, in the Malay tongue, *river serpent*.

places ; others love the water, as the pythons, or *culebras de agua.*

Advancing toward the west, we find the paps, or islets, in the deserted branch of the Oroonoko, crowned with the same palm-trees, that rise on the rocks of the cataracts. One of these paps, called Keri, is celebrated in the country on account of a white spot, that shines from afar, in which the natives profess to see the image of the full Moon. I could not climb this steep rock, but I believe the white spot to be a large nodule of quartz, formed by the union of several of those veins, which are so common in granites passing into gneiss. Opposite Keri, or the *rock of the Moon,* on the twin mountain Ouivitari, which is an islet in the midst of the cataracts, the Indians point out with mysterious fondness a similar white spot. It has the form of a disk ; and they say, this is the image of the Sun, *camosi.* Perhaps the geographical situation of these two objects has contributed to their having received these names. Keri is on the side of the setting, camosi on that of the rising Sun. Languages being the most ancient historical monuments of nations, some distinguished learned men have been singularly struck by the analogy the American word *camosi* bears to *camosch,* which seems to have signified originally the Sun, in one of the Semitic dialects. This analogy has given rise to hypotheses, which

appear to me at least very problematical*. The god of the Moabites, Chamos, or Camosch†, who has so wearied the patience of the learned, Apollo Chomens cited by Strabo and by Ammianus Marcellinus, Beelphegor, Amun or Hamon, and Adonis, all, without doubt, represent the Sun in the winter solstice; but what can we conclude from a solitary and fortuitous resemblance of sounds, in languages that have nothing besides in common?

The Maypure tongue is still spoken at Atures, although the mission is inhabited only by Guahivoes and Macoes. At Maypures the Guareken and Pareni tongues only, are now spoken. From the Rio Anaveni, which falls into the Oroonoko north of Atures, as far as beyond Jao, and to the mouth of the Guaviare (between the fourth and sixth degrees of latitude), we every where find rivers, the termination of which, *veni*‡, recalls to mind the extent to which the Maypure tongue heretofore prevailed. *Veni*, or *weni*, signifies water, or a river. The words *camosi* and *keri*, which we have just cited, are of the idiom

* There appeared in 1806 at Leipsick a book with this title. *Untersuchungen ueber diæ von Humboldt am Orinoco entdeckten Spuren der Phœnicishen Sprache.*

† *Voss. Theol. Gent. Lib.* 2, *cap.* 7, p. 174. *Creuzer, Symbolik der alten Vœlker*, vol. 3, p. 248. *De Wette, Hebr. arch.* 1814, p. 281.

‡ Anaveni, Mataveni, Mariveni, &c.

of the Pareni Indians *, whom I think I have heard from the natives, lived originally on the banks of the Mataveni †. The Abbé Gili considers the Pareni as a simple dialect of the Maypure. This question cannot be solved by a comparison of the roots merely. Being totally ignorant of the grammatical structure of the Pareni, I can raise but feeble doubts against the opinion of the Italian missionary. The Pareni is perhaps a mixture of two tongues, that belong to different familes; like the Maquiritari, which is composed of the Maypure and the Caribbee; or, to cite an example better known, the modern Persian, which is allied at the same time to the Sanscrit and to the Semitic tongues. The following are Pareni words, which I carefully compared with Maypure words ‡.

* Or Parenas, who must not be confounded either with the *Paravenes* of the Rio Caura (*Caulin*, p. 68), or with the Parecas, whose language belongs to the great family of the Tamanack tongues. A young Indian of Maypures, who called himself a *Paragini*, answered my questions, almost in the same words, that Mr. Bonpland heard from a *Pareni*, and which I have given in the text. I have thought it necessary to indicate the differences in the table, p. 147.

† To the south of the Rio Zama. We slept in the open air near the mouth of the Mataveni on the 28th of May, in our return from the Rio Negro.

‡ The words of the Maypure language have been taken from the works of Gili and Hervas. I collected the words placed between two parentheses from a young Maco Indian, who understood the Maypure language.

	PARENI TONGUE.	MAYPURE TONGUE.
The Sun	Camosi	Kiè (Kiepurig)
The Moon	Keri	Kejapi (Cagijapi)
A star	Ouipo	Urrupu
The devil	Amethami	Vasuri
Water	*Oueni* (*üt*)	*Oueni*
Fire	*Casi*	*Catti*
Lightning	*Eno*	*Eno-ima* *
The head	Ossipo	*Nuchibucu*
The hair	Nomao †	
The eyes	*Nopurizi*	*Nupuriki*
The nose	Nosivi	Nukirri
The mouth	Nonoma	Nunumacu
The teeth	*Nasi*	*Nati*
The tongue	Notate	Nuare
The ear	Notasine	Nuakini
The cheek	Nocaco	
The neck	*Nono*	*Noinu*
The arm	Nocano	Nuana
The hand	*Nucavi*	*Nucapi*
The breast	Notoroni	
The back	Notoli	
The thigh	Nocazo	
The nipples	Nocini	
The foot	Nocizi	Nukii

* I am ignorant of what *ima* signifies in this compound word. *Eno* means in Maypure the sky and thunder. *Ina* signifies mother.

† The syllables *no* and *nu*, joined to the words that designate parts of the body, might have been suppressed; they answer to the possessive pronoun *my*.

	PARENI TONGUE.	MAYPURE TONGUE.
The toes	Nociziriani	
The calf of the leg	Nocavua	
A crocodile	Cazuiti	Amana
A fish	*Cimasi*	*Timaki*
Maize	Cana	Jomuki
Plantain	Paratana (Teot) *	Arata
Cacao	Cacavua †	
Tobacco	*Jema*	*Jema*
Mimosa inga	(Caraba)	
Cecropia peltata	(Jocovi)	
Myrtus pimenta	(Pumake)	
Agaric	(Cajuli)	
1	Puziana (Pagiana)	Papeta (Popetas)
2	Sinapa (Achinafe)	Avanume(Avanome)
3	Meteuba (Meteufafa)	Apekiva (Pejiveji)
4	Puriana vacavi	(Jalivac)
5	Puriana vacavi uscha-nite	(Javiji)
10	Puriassima vacavi	

* We may be surprised to find the word *teot*, denote the eminently nutritive substance, that supplies the place of corn (the gift of a beneficent divinity), and on which the subsistence of man within the tropics depends. I shall mention on this occasion, that the word *Teo*, or *Teot*, which in Azteck signifies God (*Teotl*, properly *Teo*, for *tl* is only a termination), is found in the language of the Betoï of the Rio Meta. The name of the Moon, in this language so remarkable for the

† Has this word been introduced from a communication with Europeans ? It is almost identical with the Mexican (Azteck) word *cacava*. See my *Essai Polit.*, vol. ii, p. 435.

This comparison seems to prove, that the analogies observed in the roots of the Pareni and the Maypure are not to be neglected; they are however scarcely more frequent, than those that have been observed between the Maypure of the Upper Oroonoko, and the tongue of the Moxoes, which is spoken on the banks of the Marmora*, from 15° to 20° of South latitude. The Parenis have in their pronunciation the English *th*, or *tsa* of the Arabians, as I clearly heard in the word *Amethami*, devil, evil spirit. I shall not notice again the origin of the word *camosi*. Solitary resemblances of sounds are as little proof of communication between nations, as the dissimilitude of a few roots furnishes against the incontestible affiliation of the German from the Persian and the Greek. It is remarkable however, that the names of the *Sun* and *Moon* are sometimes found to be identical in languages, the grammatical construction of which is entirely different; I shall cite as examples the Gua-

complications of it's grammatical structure, is *Teo-ro*. The name of the Sun is *Teo-umasoi*. The particle *ro* designates a woman, *umasoi* a man. Among the Betoï, the Maypures, and so many other nations of both continents, the Moon is believed to be the wife of the Sun. But what is this root *Teo*? It appears to me very doubtful, that *Teo-ro* should signify *God-woman*, for *Memelu* is the name of the All-powerful Being in *Betoï*.

* *Vater*, in the *Mithridates*, vol. iii, *Abth.* ii, p. 618.

rany and the Omagua*, two languages of nations formerly very powerful. It may be conceived, that, with the worship of the stars and of the powers of nature, the words which have a relation to these objects might pass from one idiom to another. I showed the constellation of the Southern Cross to a Pareni Indian, who covered the lantern while I was taking the circummeridian heights of the stars; and he called it *Bahumehi*, a name which the *caribe fish*, or *serra-salme*, equally bears in Pareni. He was ignorant of the name of the belt of Orion; but a Poignavi† Indian, who knew the constellations better, assured me, that in his tongue the belt of Orion bore the name of *Fuebot*; he called the Moon *Zenquerot*. These two words have very singular features for words of American origin. As the names of the constellations may have been transmitted to immense distances from one nation to another, these Poignavi

* Sun and Moon, in Guarany, *Quarasi* and *Jasi*; in Omagua, *Huarassi* and *Jase*. I shall give farther on these same words in the principal languages of the two worlds. (See note A, at the end of the seventh book.)

† At the Oroonoko the *Puinaves*, or *Poignaves*, are distinguished from the *Guaypunaves* (*Uipunavi*). The latter, on account of their language, are considered as belonging to the Maypure and Cabres nations; yet water is called in Poignave, as well as in Maypure, *oueni*.

words have fixed the attention of the learned, who have endeavoured to recognize the Phœnician and Moabite tongues in the word *camosi* of the Pareni. *Fuebot* and *Zenquerot* seem to remind us of the Phœnician words *mot* (lutum), *ardod* (robur), *ephot*, &c. But what can we conclude from simple terminations, which are most frequently foreign to the roots? In Hebrew, the feminine plurals terminate also in *oth*. I noted entire phrases in Poignavi; but the young man, whom I interrogated, spoke so quick, that I could not seize the division of the words, and should have written them as Aristophanes writes Persian*.

In reflecting on the names of the missions founded by Spanish monks, we may be led into error with respect to the elements of the population employed at the period of their foundation. The Jesuits led the Maypure Indians to Encaramada and Atures, when they constructed these two villages; but the mission of Maypures itself was not founded by an assemblage of the Indians of the same name. This mission consisted originally of Guipunabis, who came

* See the speech of Artabanes, in *Acharn. Act* 1, *scene* 3. I cite this passage, because, like the Pœnulus of *Plautus*, it reminds us in what manner travellers have at all times disfigured the languages of the nations they have visited, and the sounds of which they fancied they could express by the letters of their own alphabet.

from the banks of the Inirida, and appear from the analogy of their languages, to belong to the same branch of the nations of the Upper Oroonoko as the Maypures, the Cabres, the Avani, and perhaps the Pareni. The mission, near the *raudal* of Maypures, was very considerable in the time of the Jesuits; as it reckoned six hundred inhabitants, among whom were several families of whites. Under the government of the Fathers of the Observance, the population was reduced to less than sixty. It must be observed, that in this part of South America cultivation has been diminishing for half a century, while beyond the forests, in the provinces near the sea, we find villages that contain from two to three thousand Indians. The inhabitants of Maypures are a mild temperate people, and distinguished by great cleanliness. The savages of the Oroonoko for the most part have not that inordinate fondness for strong liquors, which prevails in North America. It is true, that the Otomacks, the Jaruroes, the Achaguas, and the Caribs, are often intoxicated by the immoderate use of *chiza*, and many other fermented liquors, which they know how to prepare with cassava, maize, and the saccharine fruits of the palm-trees; but travellers have as usual generalized what belongs only to the manners of some tribes. We were frequently unable to prevail upon the Guahiboes or the

Maco-Piaroas, to take a drop of brandy, while they were labouring for us, and seemed exhausted by fatigue. It will require a longer residence of Europeans in those countries, to spread there the vices, that are already common among the Indians on the coast. In the huts of the natives of Maypures we found an appearance of order and neatness, rarely met with in the houses of the missionaries.

These natives cultivate plantains, and cassava, but no maize. Seventy or eighty pounds weight of cassava in thin cakes, which are the bread of the country, cost six reals of plate, or nearly four francs. Like the greater part of the Indians of the Oroonoko, the inhabitants of Maypures have beverages which may be called *nourishing*; one of these, much celebrated in that country, is furnished by a palm-tree, that grows wild in the vicinity of the mission on the banks of the Auvana. This tree is the *seje**; I estimated the number of flowers on one *racemus* at forty-four thousand; and that of the fruit, of which the greater part fall without ripening, at eight thousand. The fruit is a small fleshy drupe. It is immersed for a few minutes in boiling water, in order that the kernel may be separated from the parenchymatous part of the *sarcocarp*, which has a sweet taste, and is

* See *Nova Genera et Species Plantarum*, tom. 1, p. 314.

pounded and brayed in a large vessel filled with water. The infusion, which is prepared cold, yields a yellowish liquor, which tastes like milk of almonds. Sometimes *papelon* or unrefined sugar is added. The missionary told us, that the natives become visibly fatter during the two or three months, in which they drink this *seje* liquor, into which they dip their cakes of cassava. The *piaches*, or Indian jugglers, go into the forests, and sound the *botuto* (the sacred trumpet) under the *seje* palm-trees, "to force the tree," they say, "to yield an ample produce the following year." The people pay for this operation, as the Monguls, the Moors, and the nations still nearer to us, pay the *chamans*, the *marabous*, and other classes of priests, to drive away by mystic words, or by prayers, the white ants and the locusts, or to procure a cessation of continued rain, and invert the order of the seasons.

*Tengo en mi pueblo la fabrica de loza**, said father Zea, when conducting us to an Indian family, who were occupied in baking by a fire of brushwood, in the open air, large earthen vessels, two feet and a half high. This branch of manufacture is peculiar to the various tribes of the great family of the Maypures, and it appears they have followed it from time immemorial.

* "I have a manufacture of pottery in my village".

In every part of the forests, far from any human habitation, on digging the earth fragments of pottery and delft are found. The taste for this kind of fabrication seems to have been common heretofore to the natives of both Americas. To the north of Mexico, on the banks of the Rio Gila, among the ruins of an Azteck city*; in the United States, near the *tumuli* of the Miamis†; in Florida, and in every place where any traces of ancient civilization are found; the soil covers fragments of painted pottery; and the extreme resemblance of the ornaments they display is striking. Savage nations, and those civilized people‡, who are condemned by their political and religious institutions always to imitate themselves, strive as if by instinct, to perpetuate the same forms, to preserve a peculiar type or style, and to follow the methods and processes which were employed by their ancestors. In North America, fragments of delft have been discovered in places where lines of fortification

* Casas grandes. (Political Essay on New Spain, vol. i, p. 298.)

† Drake, in his interesting work, "View of Cincinnati," 1815, p. 200, 209, and 218.

‡ The Hindoos, the Tibetians, the Chinese, the ancient Egyptians, the Aztecks, the Peruvians, with whom the tendency toward civilization in a body prevented the free development of the faculties of individuals. (See my Researches on the American Monuments, Introduction, vol. xiii, p. 11 of the present work.)

are found, and the walls of towns constructed by an unknown nation, now entirely extinct. The paintings on these fragments have a great similitude to those, which are executed in our days on earthen ware by the natives of Louisiana and Florida. Thus too the Indians of Maypures often painted before our eyes the same ornaments, as we had observed in the cavern of Ataruipe, on the vases containing human bones. They are real *grecques*, meandrites, and figures of crocodiles, of monkeys, and of a large quadruped, which I could not recognize, though it has always the same squat form. I might remind the reader on this occasion of a head with the trunk of an elephant, which I discovered in an ancient Mexican painting on the Museum at Veletri*; and might hazard the hypothesis, that the great quadruped painted on the vases of Maypures belongs to another country, and that the type had been brought thither in the great migration of the American nations from the north-west to the south and south-east; but where can we stop amid such vague and uncertain conjectures? I am rather inclined to believe, that the Indians of the Oroonoko meant to figure a tapir†, and that the deformed repre-

* See vol. xiii, p. 211.

† *Danta* in the Spanish Colonies, where the name of *tapir* is totally unknown; in the Tamanac, *uariari*; in Maypure,

sentation of a native animal is become by degrees one of the types that has been preserved. Imperfection and chance often produce forms, the origin of which we gravely discuss, because we believe they have arisen from a combination of ideas, and a studied imitation.

What the Maypures execute with the greatest skill are *grecques*, in straight lines variously combined, similar to those that we find on the vases of Magna Grecia, on the Mexican edifices at Mitla, and in the works of so many nations, who, without communication with each other, find alike a sensible pleasure in the symmetric repetition of the same forms. Arabesques, meanders, and *grecques*, please our eyes, because the elements, of which their series is composed, follow in rhythmic order. The eye finds in this order, in the *periodical return* of the same forms, what the ear distinguishes in the cadenced succession of sounds and concords. Can we then admit a doubt, that the feeling of rhythm manifests itself in man at the first dawn of civilization, and in the rudest essays of poetry and song?

The natives of Maypures, among whom the women principally fabricate pottery, purify the

kiema; in Mbaja (the language of Choco), *apolicanagiguaga;* in Moxo (the tongue spoken on the banks of the Mamore), *samo;* in Chiquito, *oquitopaquis;* in Guarany, *mborebi*.

clay by repeated washings, form it into cylinders, and mould the largest vases with their hands. The American Indian is unacquainted with the potter's wheel, which was familiar to the nations of the east in the remotest antiquity. We cannot be surprised, that the missionaries have not introduced this simple and useful machine among the natives of the Oroonoko, when we recollect, that three centuries have not sufficed to make it known among the Indians of the Peninsula of Araya opposite the port of Cumana*. The colours used by the Maypures are the oxyds of iron and manganese, and particularly the yellow and red ochres, that are found in the hollows of sandstone. Sometimes the feculæ of the bignonia chica† are employed, after the pottery has been exposed to a feeble fire. This painting is covered with a varnish of *algarobo*, which is the transparent resin of the hymenæa courbaril. The large vessels in which the *chiza* is preserved are called *ciamacu*; the smallest bear the name of *mucra*, from which word the Spaniards of the coast have framed *murcura*. Not only the Maypures, but also the Guaypunabis, the Caribbees, the Otomacks, and even the Guamoes, are known at the Oroonoko for the fabrication of painted pottery, which extended

* See vol. ii, p. 286.

† See vol iv, p. 513.

formerly toward the banks of the Amazon. Orellana was struck with the painted ornaments on the ware of the Omaguas, who in his time were a numerous and commercial nation.

Before we quit these traces of infant industry among nations, which we indistinctly comprehend under the denomination of savages, I shall add one remark, which may throw some light on the history of American civilization. In the United States, west of the Alleghany mountains, particularly between the Ohio and the great lakes of Canada, on digging the earth fragments of painted pottery, mingled with brass tools, are pretty constantly found. This mixture may well surprise us in a country, where the natives at the first arrival of the Europeans were ignorant of the use of metals. In the forests of South America, which extend from the equator as far as the parallel of eight degrees of north latitude, from the foot of the Andes to the Atlantic, this painted pottery is discovered in the most desert places, but it is found accompanied by hatchets of jade and other hard stones only, skilfully perforated. No metallic tools or ornaments have ever been discovered in digging the earth, though in the mountains on the shore*, and at the back of the Cordilleras, the art of

* See vol. iii, p. 525.

melting gold and copper, and of mixing the latter metal with tin to make cutting instruments*, was known. What is the cause of this contrast between the temperate and the torrid zone? The incas of Peru had pushed their conquests and their religious wars as far as the banks of the Napo and the Amazon, where their language extended over a small space of land; but the civilization of the Peruvians, the inhabitants of Quito, and the Muyscas of New Grenada, never appears to have had any sensible influence on the moral state of the nations of Guyana. It must be observed farther, that in North America, between the Ohio, Miami, and the Lakes, an unknown people, whom systematic authors would make the descendants of the Toltecks and Aztecks, constructed walls of earth, and sometimes of stone without mortar†, from ten to fifteen feet high, and seven or eight thousand feet long. These problematical circumvallations sometimes enclosed a hundred and fifty acres of ground. In the plains of the Oroonoko, as in those of Marietta, the Miami, and the Ohio, the centre of an ancient civilization is found in the west on the back of the moun-

* New Spain, vol. ii, p. 485.

† Of siliceous limestone, at Pique, on the Great Miami; of sandstone at Creek Point, ten leagues from Chillakothe, where the wall is fifteen hundred toises long. Drake, p. 212.

tains; but the Oroonoko, and the countries lying between this great river and the Amazon, appear never to have been inhabited by nations, whose constructions have resisted the injuries of time. Though symbolical figures are found engraven on the hardest rocks, yet to the south of eight degrees of latitude, no *tumulus*, no circumvallation, no dyke of earth, similar to those that exist farther north in the plains of Varinas and Canagua*, have been found. Such is the contrast that may be observed between the eastern parts of both Americas, those which extend from the table-land of Cundinamarca† and the mountains of Cayenne toward the Atlantic, and those which stretch from the Andes of New Spain toward the Alleghany mountains. Nations advanced in civilization, of whom we discover traces on the banks of Lake Teguyo and in the *Casas grandes* of the Rio Gila, might have sent some tribes eastward into the open countries of the Missouri and the Ohio, where the climate differs little from that of New Mexico; but in South America, where the great flux of nations has continued from north to south, those who had long enjoyed the mild temperature of the

* See vol. iv, p. 314.

† This is the ancient name of the empire of the Zaques, founded by Bochica, or Idacanzas, the high priest of Iraca, in New Grenada.

back of the Equinoctial Cordilleras no doubt dreaded a descent into burning plains bristled with forests, and inundated by the periodical swellings of rivers. It is easy to conceive how much the force of vegetation, and the nature of the soil and climate, within the torrid zone, embarrassed the natives in regard to migration in numerous bodies, prevented settlements requiring an extensive space, and perpetuated the misery and barbarism of solitary hordes.

The feeble civilization introduced in our days by the Spanish monks pursues a retrograde course. Father Gili relates, that, at the time of the expedition to the boundaries, agriculture began to make some progress on the banks of the Oroonoko; and that cattle, especially goats, had multiplied considerably at Maypures. We found none, either in the mission, or in any other village of the Oroonoko; the goats had been devoured by the tigers. The black and white breed of pigs only, the latter of which are called French pigs, *puercos franceses*, because they are believed to have come from the Caribbee islands, have resisted the pursuit of wild beasts. We saw with much pleasure *guacamayas*, or tame macaws, round the huts of the Indians, and flying to the fields like our pigeons. This bird is the largest and most majestic species of parrot with naked cheeks, that we found in our travels. It is called in Maratibitan, *cahuei*.

Including the tail, it is two feet three inches long. We had observed it also on the banks of the Atabapo, the Temi, and the Rio Negro. The flesh of the *cahuei*, which is frequently eaten, is black, and somewhat tough. These macaws, the plumage of which glows with the most vivid tints of purple, blue, and yellow, are a great ornament to the Indian farm-yards; they do not yield in beauty to the peacock, the golden pheasant, the pauxis*, or the alectors. The practice of rearing parrots, birds of a family so different from the gallinaceous tribes, had already struck Columbus†. When he discovered America, he saw macaws, or large parrots, which served as food to the natives of the Caribbee islands instead of fowls.

A majestic tree more than sixty feet high, which the planters call *frutta de burro*, grows round the little village of Maypures. It is a

* The word pauxi does not denote a species in the Spanish colonies, but the two subgenera crax and ourax of Mr. Cuvier. (A distinction is made between *pauxi de piedra*, crax pauxi, and *pauxi de copete*, crax alector). The two other subgenera of the *alector* are called at the Oroonoko *pavas de monte* (penelope) and *guacharacas* (ortalida).

† *Gryn., Orb. Nov.* p. 68. The Spaniards found also in Coriana, (on the coast of Coro), in the farm yards of the Indians, *anseres anates* (ib. p. 83). Were these the Muscovy ducks (*anas moschata*,) known in the farm-yards of France by the equally improper names of *Barbary* and *Turk-*

new species of the unona*, which has the stateliness of the uvaria zeylanica of Aublet†, and which I formerly called uvaria febrifuga. It's branches are straight, and rise in a pyramid, nearly like the poplar of the Mississipi, falsely called the Lombardy poplar. The tree is celebrated on account of the use made of it's aromatic fruit, the infusion of which is a powerful febrifuge. The poor missionaries of the Orooonoko, who are afflicted with tertian fevers during a great part of the year, seldom travel with-

ish ducks, and which we found wild on the banks of the Magdalena?

* Mr. Dunal, to whom we communicated our plants of the annonaceous family, has described it by the name of unona xylopioides. (*Monogr. Anon.*, p. 117, *tab.* 21; Decandolle, *Regn. veget.*, vol. i, p. 498.) See also vol. iii, of the present work, p. 31, note.

† This species of the *Flor. Guy.*, vol. 2, *tab.* 243, often erroneously quoted as the waria zeylanica, is the unona aromatica, Dun. (unona concolor, Willd.), the aromatic fruit of which is known by the name of *malaguette*, or Ethiopian pepper (*Dunal, Anon.*, p. 46 and 112.) We must not confound the uvaria zeylanica of Aublet, which is said to be a native of the coast of Africa, and which now grows wild in French Guyana, the unona narum (uvaria zeylanica, Lamark), and the uvaria zeylanica of Linneus. The last two species are only shrubs. I am surprised that Gili speaks of the *arbol del burro* of the Encaramada (the *arará* of the Tamanacks) only as of timber for building. *Saggio*, vol. 1, p. 163.

out a little bag filled with *fruttas de burro*. I have already observed elsewhere, that between the tropics the use of aromatics, for instance very strong coffee, the croton cascarilla, or the pericarps of our unona xylopioides, is generally preferred to that of the astringent bark of cinchona, or of bonplandia trifoliata, which is the Angostura bark. The people of America have the most inveterate prejudices against the employment of the different kinds of cinchona; and in the very countries where this valuable remedy grows, they try *to cut off the fever* by infusions of scoparia dulcis, and hot lemonades prepared with sugar and the small wild lime, the rind of which is equally oily and aromatic.

The weather was very little favourable for astronomical observations. I obtained however, on the 20th of April, a good series of corresponding altitudes of the sun, according to which the chronometer gave 70° 37′ 33″ for the longitude of the mission of Maypures; the latitude was found by a star observed toward the north to be 5° 13′ 57″; and by a star observed toward the south, 5° 13′ 7″. The error of the most recent maps is half a degree of longitude, and half a degree of latitude*. It would be difficult to relate the trouble and torments, which these nocturnal observations cost us. No where is a denser

* See my Astronomical Observations, vol. 1, p. 227 and 253.

cloud of moschettoes to be found. It formed as it were a particular stratum some feet above the ground, and thickened as we brought lights to illumine the artificial horizon. The inhabitants of Maypures for the most part quit the village, to sleep in the islets amid the cataracts, where the number of insects is less; others make a fire of brush-wood in their huts, and suspend their hammocks in the middle of the smoke. The centigrade thermometer kept up in the night to 27° or 29°; and in the day to 30°. I found on 19th of April, at two o'clock in the afternoon, the a granitic sand, loose and coarse grained, 60·3°*; another granitic sand of the same white colour, but fine grained and more dense, 52·5°; and the temperature of a bare rock of granite 47·6°. The thermometer, at the same time, 8 feet above the ground in the shade was 29·6°; in the sun, 36·2°. An hour after sunset, the coarse grained sand had the temperature of 32°; and the granite rock, 38·8°; the air was then at 28·5°; the water of the Oroonoko in the raudal, near the surface, 27·6°; and that of a fine spring issuing from granite, behind the house of the missionary, 27·8°†. This is perhaps somewhat less than the mean annual

* 48.2°. R. Grasses of the freshest green vegetated in this sand.

† 22·2° R.

heat of the atmosphere at Maypures. I found the dip of the magnetic needle at Maypures 31·1° (centesimal division), consequently 1·15° less than the dip at the village of Atures, which is 25′ of latitude farther north. I do not find in my registers the original observation of the intensity of the magnetic force; it is merely said, that I had determined it in the open air, near the church, and that it differed little from that of Atures.

April the 21st. Having spent two days and half in the little village of Maypures, on the banks of the Great Upper Cataract, we embarked at two in the afternoon in the same canoe, which the missionary of Carichana had parted with to us; and which was much damaged by the shoals it had struck against, and the carelessness of the Indians. Still greater dangers awaited it. It was to be dragged over land, across an isthmus of thirty-six thousand feet; from the Rio Tuamini to the Rio Negro, to go up by the Cassiquiare to the Oroonoko, and to repass the two *raudales*. We examined the bottom and sides of the canoe, and judged it to be capable of sustaining this long journey.

When the traveller has passed the Great Cataracts, he feels as if he were in a new world; and had overstepped the barriers, which nature seems to have raised between the civilized countries of the coast, and the savage and unknown

interior. Toward the east, in the bluish distance, appeared for the last time the high chain of the Cunavami mountains. It's long, horizontal ridge reminded us of the Mesa of Bergantin, near Cumana; but it terminates by a truncated summit. The Peak of Calitamini (the name given to this summit) glows at sunset as with a reddish fire. This appearance is every day the same. No one ever approached this mountain, the height of which does not exceed six hundred toises*. I believe this splendor, commonly reddish and sometimes silvery, to be a reflexion produced by large plates of talc, or by gneiss passing into mica-slate. The whole of this country contains granitic rocks, on which here and there, in little plains, an argillaceous grit-stone immediately reposes, containing fragments of quartz, and of brown iron ore.

In going to the *embarcadere*, we caught on the trunk of a hevea† a new species of tree frog, remarkable for it's beautiful colours; it had a yellow belly, the back and head of a fine velvetty purple, and a very narrow stripe of white from the point of the nose to the hinder extremities. This frog was two inches long, and allied to the *rana tinctoria*, the blood of which,

* It is seen at Maypures under an apparent angle of 1° 27′.

† One of the trees, the milk of which yields caoutchouc.

it is asserted, introduced into the skin of a parrot, in places where the feathers have been plucked out, occasions the growth of frizzled feathers of a yellow or red colour. The Indians showed us on the way what is no doubt very curious in that country, traces of cart wheels in the rock. They spoke, as of an unknown animal, of those beasts with large horns, which, at the time of the expedition to the boundaries, drew the boats through the valley of Keri from the Rio Toparo to the Rio Cameji, to avoid the cataracts, and spare the trouble of unloading the merchandize. I believe those poor inhabitants of Maypures would now be as much astonished at the sight of an ox of the Spanish breed, as the Romans were at the sight of the *Lucanian oxen*, as they called the elephants of the army of Pyrrhus.

By a running canal through the valley of Keri, joining the little rivers Cameji and Toparo, the passage of boats through the raudales might be rendered superfluous. On this simple idea was founded the project, the first sketch of which I submitted to the Spanish government by means of the captain-general of Caraccas, Mr. de Guevara-Vasconzelos. The cataract of Maypures furnishes, by the nature of the surrounding soil, facilities which would be sought in vain at Atures. The canal would be two thousand eight hundred and fifty, or one thou-

sand three hundred and sixty toises in length, according to the spot where it was commenced, either near the mouths of the two little rivers, or nearer their sources. The general slope of the ground appears to have an inclination of six or seven toises, from S.S.E. to N.N.W., and the soil of the valley of Keri is entirely flat, with the exception of a small ridge, or *ligne de faite*, in the parallel of the church of Maypures, which separates the two tributary streams so that they take different courses. The execution of this project would cost but little, the isthmus consisting for the most part of alluvial earth. The employment of gunpowder would be altogether unnecessary. This canal, which ought not to exceed ten feet in breadth, might be regarded as a navigable arm of the Oroonoko. It would not require the construction of sluices, and the boats going to the Upper Oroonoko would no longer be damaged, as they now are, by friction against the rugged rocks of the raudal. They would be tracked up; and as it would not be necessary to unload the merchandize, a considerable loss of time would be avoided. It has been inquired, what would be the use of the canal I have proposed? The following is the answer I gave to the ministry in 1801, at the time of my journey to Quito. "I have suggested the construction of the canal of Maypures, and of another of which I shall speak

hereafter, on the supposition only, that the government will occupy itself seriously with the commerce and agricultural industry of the Upper Oroonoko. In the present state of things, in the neglect to which you seem to doom the banks of that majestic river, canals would be almost useless."

We embarked at *Puerto de Arriba*, and passed the *Raudal de Cameji* with some difficulty. This passage is reputed to be dangerous, when the water is very high; but we found the surface of the river beyond the *raudal* as smooth as glass. We passed the night in a rocky island called Piedra Raton; which is three quarters of a league long, and displays that singular aspect of rising vegetation, those clusters of shrubs, scattered over a bare and rocky soil, of which we have often spoken. I obtained several observations of the stars during the night, and found the latitude of this island to be 5° 4′ 31″, and it's longitude 70° 37′. The river gave the images of the stars by reflexion; although we were in the middle of the Oroonoko, the cloud of moschettoes was so thick, that I had not the patience to level the artificial horizon.

April the 22d. We departed an hour and a half before sunrise. The morning was humid, but delicious; not a breath of wind was felt, for south of Atures and Maypures a perpetual calm prevails. On the banks of the Rio Negro

and the Cassiquiare, at the foot of Cerro Duida, and at the mission of Santa Barbara, we never heard that rustling of the leaves, which has a peculiar charm in burning climates. The windings of rivers, the shelter of mountains, the thickness of the forests, and the almost continual rains, at one or two degrees of latitude north of the equator, contribute no doubt to this phenomenon, which is peculiar to the missions of the Oroonoko.

In the valley of the Amazon, which is south of the equator, but at the same distance from it, a strong wind rises every day two hours after the culmination of the sun. This wind blows constantly against the stream, and is felt only in the bed of the river. Below San Borja it is an easterly wind; at Tomependa, I found it between north and north-north-east; it is still the same breeze, the wind of the rotation of the globe, but modified by slight local circumstances. By favor of this general breeze you may go up the Amazon from the Grand-Para as far as Tefe under sail, a length of seven hundred and fifty leagues. In the province of Jaen de Bracamoros, at the foot of the western declivity of the Cordilleras, this Atlantic breeze rises sometimes to a real tempest. You can scarcely keep upon your legs when you approach the banks of the river; such are the singular disparities between the Upper Oroonoko and the Upper Maragnon.

It is highly probable, that the great salubrity of the Amazon is owing to this constant breeze. In the stagnant air of the Upper Oroonoko the chemical affinities act more powerfully, and more deleterious miasmata are formed. The insalubrity of the climate would be the same on the woody banks of the Amazon, if this river, running like the Niger from west to east, did not follow in it's immense length the same direction, which is that of the trade-winds. The valley of the Amazon is closed only at it's western extremity, where it draws near the Cordilleras of the Andes. Toward the east, where the sea breeze strikes the New Continent, the shore is raised but a few feet above the level of the Atlantic. The Upper Oroonoko first runs from east to west*, and then from north to south. Where it's course is nearly parallel to that of the Amazon, a very hilly country, the group of the mountains of Parima and of Dutch and French Guyana, separates it from the Atlantic, and prevents the wind of rotation from reaching Esmeralda. This wind begins to be powerfully felt only from the confluence of the Apure, where the Lower Oroonoko runs from west to east, in a vast plain open toward the Atlantic, and therefore the climate of this part of the river is less noxious than that of the Upper Oroonoko.

* Properly from E.S.E., to W.N.W.

In order to add a third point of comparison, I shall mention the valley of the Rio Magdalena, which like the Amazon has one direction only, but unfortunately instead of being that of the breeze it is from south to north. Situate in the region of the trade-winds, the Rio Magdalena has the stagnant air of the Upper Orooonoko. From the canal of Mahates as far as Honda, particularly south of the town of Mompox, we never felt the wind blow but at the approach of the storms of night. When, on the contrary, you proceed up the river beyond Honda, you find the atmosphere often agitated. The strong winds that are ingulfed in the valley of Neiva are noted for their excessive heat. We may be at first surprised to perceive, that the calm ceases as we approach the lofty mountains, in the upper course of the river, but this astonishment ends when we recollect, that the dry and burning winds of the *Llanos de Neiva* are the effect of descending currents. The columns of cold air rush from the top of the *Nevados* of Quindiu and of Guanacas into the valley, driving before them the lower strata of the atmosphere. Every where the unequal heating of the soil, and the proximity of mountains covered with perpetual snows, cause partial currents within the tropics, as well as in the temperate zone. The violent winds of Neiva are not the effect of a repercussion of the trade-

winds; they rise where the breeze cannot come; and if the mountains of the Upper Oroonoko, the tops of which are generally crowned with trees, were more elevated, they would produce the same impetuous movements in the atmosphere, as we observe in the Cordilleras of Peru, of Abyssinia, and of Thibet. The intimate connection that exists between the direction of rivers, the height and disposition of the adjacent mountains, the movements of the atmosphere, and the salubrity of the climate, is a subject well worthy attention. The study of the surface and the inequalities of the soil would indeed be irksome and steril, were it not connected with more general considerations.

At the distance of six miles from the island of Piedra Raton we passed first, on the east, the mouth of the Rio Sipapo, called Tipapu* by the Indians; and then, on the west, the mouth of the Rio Vichada. Near the latter are some rocks covered by the water, that form a small cascade, or *raudalito*. The Rio Sipapo, which

* The sources of the Rio Tipapu, it is said, are north of the parallel of Atures, on the eastern side of those granitic mountains, from which the Rio Cataniapo rises. In the upper part of it's course it bears the name of *Uapu* or *Tuapu*. One of it's tributary streams, the *Auvana*, which Surville has transformed into *Abana*, and Caulin into *Amanaveni* (water or river, *veni*, of Amana), is remarkable for the fine cascade of *Arucuru*, above the *Raudal* of *Quiamacuana*.

Father Gili went up in 1757, and which he says is twice as broad as the Tiber, comes from a considerable chain of mountains, which in it's southern part bears the name of the river, and joins the group of Calitamini, and of Cunavami. Next to the Peak of Duida, which rises above the mission of Esmeralda, the *Cerros* of *Sipapo* appeared to me the most lofty of the whole Cordillera of Parima. They form an immense wall of rocks, shooting up abruptly from the plain, the craggy ridge of which runs from S.S.E. to N.N.W. I believe these crags, these indentations, which equally occur in the sandstone of Mount Serrat in Catalonia, are owing to blocks of granite heaped together. The *Cerros de Sipapo** wear a different aspect every hour of the day. At sunrise the thick vegetation, with which these mountains are clothed, is tinged with that dark green inclining to brown, which is peculiar to a region where trees with coriaceous leaves prevail. Broad and strong shadows are projected on the neighbouring plain, and form a contrast with the vivid light diffused over the ground, in the air, and

* I set these mountains at the island Piedra Raton, whence they bore S. 45° E., at the mission of Santa Barbara, N. 26° W.; at the mouth of the Mataveri, N. 49° E. The mountains, which the missionary Gili designates by the name of *Cerros de Jujamari*, form no doubt a separate group, east or north-east of the *Cerros de Sipapo*.

on the surface of the waters. But toward noon, when the sun reaches it's zenith, these strong shadows gradually disappear, and the whole group is veiled by an aerial vapour of a much deeper azure than that of the lower regions of the celestial vault. These vapours, circulating around the rocky ridge, soften it's outline, temper the effects of the light, and give the landscape that aspect of calmness and repose, which in nature, as in the works of Claude Lorrain and Poussin, arises from the harmony of forms and colours.

Cruzero, the powerful chief of the Guaypunabis, long resided behind these mountains of Sipapo, after having quitted with his warlike horde the plains between the Rio Inirida and the Chamochiquini. The Indians told us, that the forests which cover the Sipapo abound in *vehuco de maimure*. This *liana* is celebrated among the Indians, and serves for making baskets and weaving mats. The forests of Sipapo are altogether unknown, and there the missionaries place the nation of the *Rayas**, who have their mouth in the navel. An old Indian, whom we met at Carichana, and who boasted of having often eaten human flesh, had seen these *acephali*

* *Rays*, on account of the pretended analogy with the fish of this name, the mouth of which seems as if forced backward below the body.

" with his own eyes." These absurd fables are spread as far as the Llanos, where you are not always permitted to doubt the existence of the *Raya* Indians. In every zone intolerance accompanies credulity; and it might be said, that the fictions of ancient geographers had passed from one hemisphere to the other, did we not know, that the most fantastic productions of the imagination, like the works of nature, furnish every where a certain analogy of aspect and of form.

We landed at the mouth of the Rio Vichada or Visata, to examine the plants of that country. The scenery is very singular. The forest is thin, and an innumerable quantity of small rocks rise from the plain. These form massy prisms, ruined pillars, and solitary towers, fifteen or twenty feet high. Some are shaded by the trees of the forest, others have their summits crowned with palms. These rocks are of granite passing into gneiss. If this were not the region of primitive formations, the traveller might think himself transported amid the rocks of Adersbach in Bohemia, or of Streitberg and of Fantaisie in Franconia, where the sandstones and secondary limestones do not affect stranger forms. At the confluence of the Vichada the rocks of granite, and what is still more remarkable the soil itself, are covered with moss and lichens. These latter resemble the cladonia

pyxidata and the lichen rangiferinus, so common in the north of Europe. We could scarcely persuade ourselves, that we were elevated less than one hundred toises above the level of the Ocean, in five degrees of latitude, in the centre of that torrid zone, which has so long been thought to be destitute of cryptogamous plants. The mean temperature* of this shady and humid spot probably exceeds twenty-six degrees of the centigrade thermometer. Reflecting on the small quantity of rain which had hitherto fallen, we were surprised at the beautiful verdure of the forests. This circumstance characterizes the valley of the Upper Oroonoko; on the coast of Caraccas, and in the Llanos, the trees in winter† are stripped of their leaves, and the ground is covered only with a yellow and withered grass. Between the solitary rocks which we have just described arise some high plants of columnar cactus (*cactus septemangularis*), a very rare appearance south of the cataracts of Atures and Maypures.

Amid this picturesque scene, Mr. Bonpland was fortunate enough to find several specimens of laurus cinnamomoides, a very aromatic species

* This estimation is founded on the temperature of the sources of the Atures.

† In the season called summer in South America, north of the equator. See vol. iv, p. 88.

of cinnamon, known at the Oroonoko by the names of *varimacu* and of *canelilla**. This valuable production is found also in the valley of Rio Caura, as well as near the Esmeralda, and east of the Great Cataracts. The jesuit Francisco de Olmo appears to have been the first who discovered the canelilla, which he did in the country of the Piaroas, near the sources of the Cataniapo. The missionary Gili, who did not advance so far as the country I am now describing, seems to confound the *varimacu* or *guarimacu*, with the myristica† or nutmeg tree of America. These barks and aromatic fruits, the cinnamon, the nutmeg, the myrthus pimenta, and the laurus pucheri, would have become important objects of trade, if Europe, at the period of the discovery of the New World, had not already been accustomed to the spices and aromatics of India. The cinnamon of the Oroonoko, and that of the Andaquies missions,

* The diminutive of the Spanish word *canela*, which signifies, cinnamomum (kinnamomon of the Greeks). This last word is among the small number of those, which passed in the most remote antiquity from the Phœnician (a Semitic tongue) into the western languages. (*Gessenius Gesch. der Hebraischen Sprache*, 1815, p. 66.)

† We have given a figure of a nutmeg tree of the New Continent, the myristica otoba, in the "Equinoctial Plants," vol. ii, p. 78, plate 103. This plant differs from the virola sebifera of Aublet.

the cultivation of which Mr. Mutis introduced at Mariquita* are however less aromatic than the cinnamon of Ceylon, and would still be so, even if dried and prepared by similar processes.

Every hemisphere produces plants of a different species; and it is not by the diversity of climates that we can attempt to explain, why equinoctial Africa has no laurineæ, and the New World no heaths; why the calceolariæ are found only in the southern hemisphere; why the birds of the continent of India glow with colours less splendid than the birds of the hot parts of America; finally, why the tiger is peculiar to Asia, and the ornithorhincus to New-Holland. In the vegetable as well as in the animal kingdom, the causes of the distribution of the species are among the number of mysteries, which natural philosophy cannot reach. This science is not occupied in the investigation of the origin of beings, but of the laws according to which they are distributed on the globe. It examines the things that are, the coexistence of vegetable and animal forms in each latitude, at different heights, and at different degrees of temperature; it studies the relations under which particular organizations are more vigorously developed, multiplied, or modified; but it approaches not problems, the solution of which is impossible,

* A town of New Grenada, west of Honda.

since they touch the origin, the first existence of a germe of life. We may add, that the attempts which have been made, to explain the distribution of various species on the globe by the sole influence of climate, date at a period when physical geography was still in it's infancy; when, recurring incessantly to pretended contrasts between the two worlds, it was imagined, that the whole of Africa and of America resembled the deserts of Egypt and the marshes of Cayenne. At present, when men judge of the state of things not from one type arbitrarily chosen, but from positive knowledge, it is ascertained, that the two continents in their immense extent contain countries that are altogether analogous. There are regions of America as barren and burning as the interior of Africa. The islands that produce the spices of India are scarcely remarkable for their dryness; and it is not on account of the humidity of the climate, as it has been affirmed in recent works, that the New Continent is deprived of those fine species of laurineæ and myristicæ, which are found united in one little corner of the Earth in the Archipelago of India. For some years past the real cinnamon has been cultivated with success in several parts of the New Continent; and a zone that produces the coumarouna*, the

* The Tonga bean, coumarouna odora of Aublet.

vanilla, the pucheri, the pine-apple, the myrtus pimenta, the balsam of tolu, the myroxylon peruvianum, the crotons, the citrosmas, the pejoa*, the *incienso* of the Silla of Caraccas†, the *quereme*‡, the pancratium, and so many majestic liliaceous plants, cannot be considered as destitute of aromatics. Besides, a dry air favors the development of the aromatic, or exciting properties, only in certain species of plants. The most cruel poisons are produced in the most humid zone of America; and it is precisely under the influence of the long rains of the tropics, that the American pimento, capsicum baccatum§, the fruit of which is often as caustic and fiery as Indian pepper, vegetates best. From the whole of these considerations it follows, 1st, that the New Continent possesses spices, aromatics, and very active vegetable poisons, that are peculiar to itself, differing specifically from those of the ancient world; 2dly, that the primitive distribution of species in the torrid zone cannot be explained by the influence of cli-

* Gaultheria odorata.

† Trixis neriifolia. See vol. iii, p. 500. (Baillieria neriifolia, *Nov. Gen.*, vol. iv, p. 227.)

‡ Thibaudia quereme. (*Nov. Gen.*, vol. iii, p. 274.)

§ Mr. Robert Brown, in his important researches on the origin of the cultivated plants of equinoctial Africa, considers the genus capsicum as belonging exclusively to the New Continent. (*Botany of Congo*, 1818, p. 52.)

mate solely, or by the distribution of temperature, which we observe in the present state of our planet; but that this difference of climates leads us to perceive, why a given type of organization develops itself more vigorously in such or such local circumstances. We can conceive, that a small number of the families of plants, for instance the musaceæ and the palms, cannot belong to very cold regions, on account of their internal structure, and the importance of certain organs*; but we cannot explain why no one of the family of melastomas vegetates north of the parallel of thirty degrees, or why no rose-tree belongs to the southern hemisphere. Analogy of climates is often found in the two continents, without identity of productions.

The Rio Vichada (Bichada), which has a small *raudal* at it's confluence with the Orooonoko, appeared to me, next to the Meta and the Guaviare, to be the most considerable river coming from the west. During the last forty years no European has navigated the Vichada. I could learn nothing of it's sources; they rise, I believe, with those of the Tomo, in the plains that extend to the south of Casimena. It appears to me at least not to be doubtful, that the most ancient missions were founded on the

* The *frondes*, so important from their size, would not resist vigorous cold.

banks of the Vichada by Jesuits who came from the missions of Casanare. Fugitive Indians of Santa Rosalia de Cabapuna, a village situate on the banks of the Meta, have arrived even recently, by the Rio Vichada, at the cataract of Maypures; which sufficiently proves, that the sources of this river are not very distant from the Meta. Father Gumilla has preserved the names of several German and Spanish Jesuits, who in 1734 fell victims to their zeal for religion by the hands of the Caribs, on the now desert banks of the Vichada.

Having passed the Canno Pirajavi on the east, and then a small river on the west, which issues, as the Indians say, from a lake called Nao, we rested at night on the shore of the Oroonoko, at the mouth of the Zama, a very considerable river, as unknown as the Vichada. Notwithstanding the black waters of the Zama, we suffered greatly from insects. The night was beautiful, without a breath of wind in the lower regions of the atmosphere, but towards two in the morning we saw thick clouds crossing the zenith rapidly from east to west. When declining toward the horizon, they traversed the great nebulæ of Sagittarius and the Ship, they appeared of a dark blue. The light of the nebulæ is never more splendid, than when they are in part covered by sweeping clouds. We observe the same phenomenon in

Europe in the Milky Way, in the aurora borealis when it beams with a silvery light; and at the rising and setting of the sun, in the part of the sky that is whitened* from causes, which philosophers have not yet sufficiently explained.

The vast space of ground, that lies between the Meta, the Vichada, and the Guaviare, is altogether unknown a league from the banks; but is believed to be inhabited by wild Indians of the tribe of Chiricoas, who fortunately build no boats. Formerly, when the Caribbees, and their enemies the Cabres, traversed these regions with their little fleets of rafts and canoes, it would have been imprudent to have passed the night near the mouth of a river running from the west. The little settlements of the Europeans having now caused the independent Indians to retire from the banks of the Upper Oroonoko, the solitude of these regions is such, that from Carichana to Javita, and from Esmeralda to San Fernando de Atabapo, during a course of one hundred and eighty leagues, we did not meet one single boat.

At the mouth of the Rio Zama we entered a class of rivers, that merits great attention. The Zama, the Mataveni, the Atabapo, the Tuamini, the Temi, and the Guainia, are *aguas negras*, that is, their waters, seen in a large body, ap-

* The dawn: in French *aube* (*alba*), *albente cælo*.

pear brown like coffee, or of a greenish black. These waters notwithstanding are the most beautiful, the clearest, and the most agreeable to the taste. I have observed above, that the crocodiles, and, if not the zancudoes, at least the moschettoes generally shun the black waters. The people assert too, that these waters do not embrown the rocks; and that the white rivers have black borders, while the black rivers have white. In fact, the shores of the Guainia, known to the Europeans by the name of the Rio Negro, frequently exhibit masses of quartz issuing from granite, and of a dazzling whiteness. The waters of the Mataveni, when examined in a glass, are pretty white; those of the Atabapo retain a slight tinge of yellowish-brown. When the least breath of wind agitates the surface of these *black rivers*, they appear of a fine grass green, like the lakes of Switzerland. In the shade, the Zama, the Atabapo, and the Guainia, are as dark as coffee grounds. These phenomena are so striking, that the Indians every where distinguish the waters by black and white. The former have often served me for an artificial horizon; they reflect the image of the stars with admirable clearness.

The colour of the waters of springs, rivers, and lakes, ranks among those physical problems, which it is difficult, if not impossible, to solve by direct experiments. The tints of re-

flected light are generally very different from the tints of transmitted light; particularly when the transmission takes place through a great portion of fluid. If there were no absorption of rays, the transmitted light would be of a colour complementary to that of the reflected light; and in general we judge ill of transmitted light, by filling with water a shallow glass with a narrow aperture. In a river the colour of the reflected light comes to us always from the interior strata of the fluid, and not from the upper stratum*.

Some celebrated naturalists, who have examined the purest waters of the glaciers, and those which flow from mountains covered with perpetual snows, where the earth is destitute of the relics of vegetation, have thought, that the proper colour of water might be blue, or green. Nothing, in fact, proves, that water is by nature white, and that we must always admit the presence of a colouring principle, when water viewed by reflection is coloured. In the rivers that contain a colouring principle, this principle is generally so little in quantity, that it eludes all chemical research. The tints of the Ocean seem often to depend neither on the nature of the bottom, nor on the reflection of

* Newton, *Opt. Lib.* 1, p. 2, prop. 10, prob. 5. Delaval, on the permanent Colours of opake Bodies, in the Manchester Mem., 1789, vol. ii, p. 240.

the sky on the clouds. It is said, a great naturalist, Sir Humphry Davy, thinks, that the tints of different seas may very likely be owing to different proportions of iodin.

On consulting the geographers of antiquity we find, that the Greeks were struck by the blue waters of Thermopylæ, the red waters of Joppa, and the black waters of the hot-baths of Astyra, opposite Lesbos*. Some rivers, the Rhone for instance, near Geneva, have a decidedly blue colour. It is said, that the snow waters, in the Alps of Switzerland, are sometimes of an emerald green approaching to grass green. Several lakes of Savoy and of Peru have a brown colour approaching black. Most of these phenomena of coloration are observed in waters that are believed to be the purest, and it is rather from reasonings founded on analogy, than from any direct analysis, that we may throw some light on so uncertain a matter. In the vast system of rivers which we have traversed (and this fact appears to me striking) the *black waters* are principally restricted to the equatorial band. They begin to be found about five degrees of north latitude; and abound thence to beyond the equator as far as about two degrees of south

* Pausanias, vol. 2, *Messen.*, *cap.* 35 (Clavier's edit., p. 488). See also Strabo, lib. 16, ed. Almalov., vol. 2, p. 1125, B.

latitude. The mouth of the Rio Negro is indeed in the latitude of 3° 9′; but in this interval the black and white waters are so singularly mingled in the forests and the savannahs, that we know not to what cause the coloration of the waters must be attributed. The waters of the Cassiquiare, which fall into the Rio Negro, are as white as those of the Oroonoko, from which it issues. Of two tributary streams of the Cassiquiare very near each other, the Siapa and the Pacimony, one is white, the other black.

When the Indians are interrogated respecting the causes of these strange colorations, they answer, as questions in natural philosophy or physiology are sometimes answered in Europe, by repeating the fact in other terms. If you address yourself to the missionaries, they reply, as if they had the most convincing proofs of their assertion, "the waters are coloured by washing the roots of the sarsaparilla." The smilaceæ no doubt abound on the banks of the Rio Negro, the Pacimony, and the Cababury; their roots, macerated in the water, yield an extractive matter, that is brown, bitter, and mucilaginous; but how many tufts of smilax have we seen in places, where the waters were entirely white! In the marshy forest which we traversed, to convey our canoe from the Rio Tuamini to the *Canno* Pimichin and the Rio Negro, why, in the same soil, did we ford alternately rivulets of

black and white water? Why was no river ever found white near it's springs, and black in the lower part of it's course? I know not whether the Rio Negro preserve it's yellowish brown colour as far as it's mouth, notwithstanding the great quantity of white water it receives from the Cassiquiare and the Rio Blanco. Mr. de la Condamine, not having seen this river north of the equator, could not judge of the difference of colour.

Although on account of the abundance of the rivers vegetation is more vigorous close to the equator than eight or ten degrees north or south, it cannot be affirmed, that the rivers with black waters rise principally in the most shady and thickest forests. On the contrary, a great number of the *aguas negras* come from the open savannahs, that extend from the Meta beyond the Guaviare toward the Caqueta. In a voyage which I made with Mr. de Montufar from the port of Guayaquil to Bodegas de Babaojo, at the period of the great inundations, I was struck by the analogy of colour displayed by the vast savannahs of the *Invernadero del Garzal* and of *Lagartero*, and the aspect of the Rio Negro and the Atabapo. These savannahs, partly inundated during three months, are composed of paspalum, eriochloa, and several species of cyperaceæ. We sailed on waters that were from four to five feet deep; their temperature

was by day from 33° to 34° of the centigrade thermometer; they exhaled a strong smell of sulphuretted hydrogen, to which no doubt some rotten plant of arum and heliconia, that swam on the surface of the pools, contributed. The waters of *Lagartero* were of a golden yellow by transmitted, and coffee brown by reflected light. They are no doubt coloured by a carburet of hydrogen. An analogous phenomenon is observed in the dunghill waters prepared by our gardeners, and in the waters that issue from bogs. May we not also admit, that it is a mixture of carbon and hydrogen, an extractive vegetable matter, that colours the black rivers, the Atabapo, the Zama, the Mataveni, and the Guainia? The frequency of the equatorial rivers contributes no doubt to this coloration by filtrations through a thick wad of grasses. I suggest these ideas only in the form of a doubt. The colouring principle seems to be in very little abundance; for I observed, that the waters of the Guainia or Rio Negro, when subjected to ebullition, do not become brown like other fluids charged with carburets of hydrogen.

It is also very remarkable, that this phenomenon of *black waters*, which might be supposed to belong only to the low regions of the torrid zone, is found also, though rarely, on the table-lands of the Andes. The town of Cuenca in the Kingdom of Quito, is surrounded by three small

rivers, the Machangara, the Rio del Matadero, and the Yanuncai; of which the two former are white, and the waters of the last are black (*aguas negras*). These waters, like those of the Atabapo, are of a coffee colour by reflection, and pale yellow by transmission. They are very fine, and the inhabitants of Cuenca, who drink them in preference, do not fail to attribute their colour to the sarsaparilla, which it is said grows abundantly on the banks of the Rio Yanunçai*.

April 23d. We left the mouth of the Zama at five in the morning. The river continued to be skirted on both sides by a thick forest. The mountains on the east seemed to retire by degrees farther back. We passed first the mouth of the Rio Mataveni, and afterward an islet of a very singular form; a square granitic rock, that rises like a trunk in the middle of the water. It is called by the missionaries *El Castillito*. Black bands seem to indicate, that the highest swellings of the Oroonoko do not rise at this place above eight feet; and that the great swellings observed lower down are owing to the tributary streams, which

* Although the species of smilax abound principally in hot and temperate regions (from 0 to 500 toises), we have however found them between 700 and 1400 toises. See our *Nov. Gen. Plant.*, vol. 1, p, 72.

flow into it north of the *raudales* of Atures and Maypures. We passed the night on the right bank opposite the mouth of the Rio Siucurivapu, near a rock called Aricagua. During the night an innumerable quantity of bats issued from the clefts of the rock, and hovered around our hammocks. I have mentioned in another place how injurious these animals are to the cattle; their number is particularly augmented in years of great drought*.

April 24th. A violent rain obliged us early to rejoin our boat. We departed at two o'clock, after having lost some books, which we could not find in the darkness of the night, on the rock of Aricagua. The river runs straight from south to north; it's banks are low, and shaded on both sides by thick forests. We passed the mouths of the Ucata, the Arapa, and the Caranaveni. About four in the afternoon we landed at the *Conucos de Siquita*, the Indian plantations of the mission of San Fernando. These good people wished to detain us among them, but we continued to go up against the current, which ran at the rate of five feet a second. This was the result of a measurement I made by observing the time, that a floating body took to go down a given distance. We

* In Brazil, in the province of Ciara, the bats cause such destruction among the cows, that rich farmers are sometimes reduced by them to indigence. *Corog. Bras.*, vol. 2, p. 224.

entered the mouth of the Guaviare in a dark night, passed the point where the Rio Atabapo joins the Guaviare, and arrived at the mission after midnight. We were lodged as usual at the *Convent*, that is, in the house of the missionary, who, though much surprised at our unexpected visit, did not the less receive us with the kindest hospitality.

CHAPTER XXII.

San Fernando de Atabapo.—San Balthasar.—The rivers Temi and Tuamini.—Javita.—Portage from the Tuamini to the Rio Negro.

During the night we had left, almost unperceived, the waters of the Oroonoko; and at sunrise found ourselves as if transported to a new country, on the banks of a river the name of which we had scarcely ever heard pronounced, and which was to conduct us, by the *portage* of Pimichin, to the Rio Negro, on the frontiers of Brazil. "You will go up," said the president of the missions, who resides at San Fernando, "first the Atabapo, then the Temi, and finally, the Tuamini. When the force of the current of *black waters* hinders you from advancing, you will be conducted out of the bed of the river through forests, which you will find inundated. Two monks only are settled in those desert places, between the Oroonoko and the Rio Negro; but at Javita you will be furnished with the

means of having your canoe drawn over land in the course of four days to Canno Pimichin. If it be not broken to pieces, you will descend the Rio Negro without any obstacle (from north-west to south-east) as far as the little fort of San Carlos; you will go up the Cassiquiare (from south to north), and then return to San Fernando in a month, descending the Upper Oroonoko from east to west." Such was the plan traced for our navigation, and which we executed, not without suffering, but without danger, and with facility, in the space of thirty-three days. The sinuosities in this labyrinth of rivers are such, that, without the aid of the itinerary map which I traced, it would be almost impossible to form an idea of the road by which we went from the coast of Caraccas, through the inland country, to the limits of the *Capitania General* of Grand Para. I must remind those who disdain to fix their eyes on maps filled with names difficult for the memory to retain, that the Oroonoko runs from it's source, or at least from Esmeralda, as far as San Fernando de Atabapo, from east to west; that from San Fernando, where the junction of the Guaviare and the Atabapo takes place, as far as the mouth of the Rio Apure, it flows from south to north, forming the Great Cataracts; and, finally, that from the mouth of the Apure as far as Angostura and the coasts of the Ocean it's

direction is from west to east. In the first part of it's course, where the river flows from east to west, it forms that celebrated bifurcation so often disputed by geographers, of which I was the first enabled to determine the situation by astronomical observations. One arm of the Oroonoko, the Cassiquiare, running from north to south, falls into the Guainia, or Rio Negro, which, in it's turn, joins the Maragnon, or river of Amazons. The most natural way therefore, to go from Angostura to Grand Para, would be to ascend the Oroonoko as far as Esmeralda, and then to go down the Cassiquiare, the Rio Negro, and the Amazon; but, as the Rio Negro in the upper part of it's course approaches very near the sources of some rivers, that fall into the Oroonoko near San Fernando de Atabapo (where the Oroonoko abruptly changes it's direction from east to west, to take that from south to north), the ascending that part of the river between San Fernando and Esmeralda, in order to reach the Rio Negro, may be avoided. Leaving the Oroonoko near the mission of San Fernando, you go up the assemblage of little black rivers (the Atabapo, the Temi, and the Tuamini), and the boats are carried across an isthmus six thousand toises broad, to the banks of a stream (the Canno Pimichin), which flows into the Rio Negro. This course, which we took, and which has been frequented more

particularly since the period, when Don Manuel Centurion* was governor of Guyana, is so short, that a messenger now carries despatches from San Carlos del Rio Negro to Angostura in twenty-three or twenty-four days, while formerly, in going up the Cassiquiare, it required fifty or sixty. You may consequently travel by the Atabapo, from the Amazon to the Oroonoko, without going up the Cassiquiare, so formidable from the force of it's current, the want of provision, and the torment of *moschettoes*. I will add, for the French reader, an example drawn from the hydrographic maps of France. In order to go from Nevers on the Loire to Montereau on the Seine, you might, instead of proceeding by the canal of Orleans, which joins, like the Cassiquiare, two systems of rivers, establish a *portage* between the tributary streams of the Loire and the Seine, and, by going up the Nievre, cross an isthmus near the village of Menou, and descend the Yonne to enter the Seine.

We shall soon see the great advantage, that would result from a running canal across the marshy ground between the Tuamini and the Pimichin. If this project be some day carried into execution, there would be no other obstacle to vanquish in going from the fort of San Car-

* *Caulin*, p. 76.

los to Angostura, the capital of Guyana, than that of ascending the Rio Negro as far as the mission of Maroa ; the rest of the navigation would be performed by means of the currents of the Temi, the Atabapo, and the Oroonoko.

The road from San Carlos to San Fernando de Atabapo is far more disagreeable, and half as long again by the Cassiquiare, as by Javita and the *Canno* Pimichin. In this region, into which the expedition of the boundaries carried no astronomical instruments, I determined, by means of the chronometer of Louis Berthoud, and by the meridional heights of stars, the situations of San Balthasar de Atabapo, Javita, San Carlos del Rio Negro, the rock Culimacavi, and of Esmeralda; the map I have constructed has consequently solved the doubts that remained of the respective distances of the Christian establishments. When no other road exists but that of tortuous and intermingled rivers, when little villages are hidden amid thick forests, and when, in a country entirely flat, no mountain, no eminent object is visible from two points at once, it is only in the sky that we can read where we are upon the Earth. In the wildest countries of the torrid zone we feel more than any where the want of astronomical observations. They are not only useful means of finishing and improving maps, but are indispensable for tracing the first sketch of the ground.

The missionary of San Fernando, with whom we remained two days, has the title of President of the Missions of the Oroonoko. The twenty-six ecclesiastics settled on the banks of the Rio Negro, the Cassiquiare, the Atabapo, the Caura, and the Oroonoko, are under his orders; and he depends in his turn on the guardian of the convent of Nueva-Barcelona, or, as they say here, the *Colegio de la Purissima Concepcion de Propaganda Fide.* His village announces somewhat less indigence than those we had hitherto found on our way, yet the number of inhabitants does not exceed two hundred and twenty-six. I have already mentioned repeatedly, that the missions near the coast, and which are equally subject to the Observantin monks, for instance, Pilar, Caigua, Huere, and Cupapui, contain each from eight hundred to two thousand inhabitants. They are larger and finer villages than we meet with in the most cultivated parts of Europe. We were assured, that the mission of San Fernando was much more populous immediately after it's first foundation, than it is at present. As we passed through it a second time, on our return from the Rio Negro, I shall here collect together the observations which we made on a point of the Oroonoko, that may become hereafter highly important to the trade and industry of the colonies.

San Fernando de Atabapo is placed near the

confluence of three great rivers; the Oroonoko, the Guaviare, and the Atabapo. It's situation is similar to that of Saint Lewis or of New Madrid, at the junctions of the Mississipi with the Missouri and the Ohio. In proportion as commerce grows brisk in these countries traversed by immense rivers, the towns situate at their confluence will necessarily become the stations of boats, depositaries of merchandize, and real centres of civilization. Father Gumilla confesses, that in his time no person had any knowledge of the course of the Oroonoko above the mouth of the Guaviare. He adds with simplicity, that he was forced to address himself to the inhabitants of Timana and of Pasto, to obtain some vague notions of the Upper Oroonoko*. We

* *Los restantes Rios de que se forma el Orinoco (arriba de la boca del Guabiare) todavia no se han registrado: y solo los demarco en mi plan por las noticias acquiridas de los habitadores de Timana y Pasto de donde el principal y los Rios accessorios descienden.* (*Gum., Orinoco ill.*, 1745, tom. i, p. 52.) The first edition of this work is in 1741, and it must be by error, that the approbation of the censor of the Company, Antonio de Goyeneche, is dated the 14th of July, 1731. The fathers Gumilla and Rotella began their first establishments in 1733 (*Gili*, vol. i, p. 60. *Gum.* vol. i, p. 209, 239, and 285; vol. ii, p. 96.); consequently the manuscript of the *Orinoco illustrado* could not have been finished in 1731. This date is important, because those of several geographical discoveries depend on it. I must observe on this occasion, that father Gumilla was only four years on the banks of the Oroonoko, not thirty, whatever the French translator of the *Orinoco*

should not now seek for information in the Andes of Popayan respecting a river, that rises on the western back of the mountains of Cayenne. Father Gumilla did not confound, as he has been falsely accused of doing, the sources of the Guaviare with those of the Oroonoko; but, ignorant of that part of the latter river which runs from east to west, from Esmeralda toward San Fernando, he supposes, that, in order to ascend the Oroonoko above the cataracts and the mouths of the Vichada and the Guaviare, it is necessary to proceed in a south-west direction. Geographers at that period had placed the sources of the Oroonoko near those of the Putumayo and the Caqueta, on the eastern declivity of the Andes of Pasto and of Popayan, consequently, according to my observations of the longitude* on the back of the Cordilleras and at Esmeralda, two hundred and forty leagues distant from their true situation. The inaccurate ideas which La Condamine had given of the branchings of the Caqueta, which seemed to corroborate the hypothesis of Sanson, have contributed to errors that have been pro-

illustrado (*Gili*, tom. i, p. 26.) may pretend. In Europe, under the vague names of the missions of the Oroonoko are confounded parts of New-Granada the most remote from the river.

* At Pasto, and at Esmeralda.

pagated for ages. D'Anville, in the first edition of his great map of South America, (an edition extremely rare, which I found in the French King's library,) laid down the Rio Negro as an arm of the Oroonoko, that branched off from the principal track between the mouths of the Meta and the Vichada, near the cataract of *los Astures* (Atures). This great geographer was then entirely ignorant of the existence of the Cassiquiare and the Atabapo; and he makes the Oroonoko or Rio Paragua, the Japura, and the Putumayo take their rise from three branchings of the Caqueta. It was the expedition of the boundaries, commanded by Ituriaga and Solano, that made known the real state of things. Solano was the geographical engineer of this expedition; he advanced in 1756 as far as the mouth of the Guaviare, after having passed the Great Cataracts. He found, that, to continue to go up the Oroonoko, he must direct his course toward the east; and that this river received at the point of it's great inflexion, in the latitude of 4° 4′, the waters of the Guaviare, which two miles higher had received those of the Atabapo. Interested in approaching the Portugueze possessions as near as possible, Solano resolved to proceed forward toward the south. At the confluence of the Atabapo and the Guaviare he found an Indian settlement of

the warlike nation of the Guaypunabis*. He gained their favour by presents, and with them founded the mission of San Fernando, to which, in order to dazzle the ministry of Madrid, he gave the pompous appellation of *Villa.*

To make known the political importance of this mission, we must recollect, what was at that period the balance of power between the petty Indian tribes of Guyana. The banks of the Lower Oroonoko had been long ensanguined by the obstinate struggle between two powerful nations, the Cabres and the Caribbees. The latter, whose principal abode since the close of the seventeenth century is between the sources of the Carony, the Esquibo, the Oroonoko, and the Rio Parima, once not only bore sway as far as the Great Cataracts, but made incursions also into the Upper Oroonoko, employing *portages* between the Paruspa† and the Caura, the Ere-

* Guipunaves, properly Uipunavi. They must not be confounded with the Puinaves or Poignaves of Ventuari, the names of some of the stars among whom I made known above. Father Gili thinks, that the names Massarinavi, Guaypunavi, and Puinavi, denote the descendants, or sons (*navi*), of three heads of families called Massari, Guay, and Pui. Thus the Achaguas call in the Maypure tongue a tribe of Caribs Chavinavi, or children (sons, *navi*) of the tiger (*chavi*); thus the Portugueze are called Jaranavi, or children (*navi*) of the flute (*jara*). *Stor. Amer.* vol. 2, p. 205.

† The Rio Paruspa falls into the Rio Paragua, and the latter into the Rio Carony, which is one of the tributary

vato and the Ventuari, the Conorichite and the Atacavi. None knew better than they the interminglings of the rivers, the proximity of the tributary streams, and the ways by which the distances to be passed might be diminished. The Caribbees had vanquished and almost exterminated the Cabres. Masters of the Lower Oroonoko, they met with resistance from the Guaypunabis, who had founded their dominion on the Upper Oroonoko; and who, together with the Cabres, the Manitivitanoes, and the Parenis, are the greatest cannibals of these countries. They inhabited originally the banks of the great river Inirida at it's confluence with the Chamochiquini, and the hilly country of Mabicore. About the year 1744, their chief, or, as the natives say, their *apoto* (king), was called Macapu. He was a man no less distinguished by his intelligence than his valour; had led a part of the nation to the banks of the Atabapo; and,

streams of the Lower Oroonoko. There is also an ancient portage of the Caribbees between the Paruspa and the Rio Chavaro, which flows into the Rio Caura above the mouth of the Erevato. In going up the Erevato you reach the savannahs, that are traversed by the Rio Manipiare above the tributary streams of the Ventuari. The Caribbees in their distant excursions sometimes passed from the Rio Caura to the Ventuari, thence to the Padamo, and then by the Upper Oroonoko to the Atacavi, which westward of Manuteso takes the name of the Atabapo.

when the jesuit Roman made his memorable expedition from the Oroonoko to the Rio Negro, Macapu suffered this missionary to take with him some families of the Guaypunabis, to settle them at Uruana, and near the cataract of Maypures. I have already observed, that this people belong, from their language, to the great branch of the Maypure nations. They are more industrious, we might also say more civilized, than the other nations of the Upper Oroonoko. The missionaries relate, that the Guaypunabis, at the time of their sway in those countries, were pretty generally clothed, and had considerable villages. After the death of Macapu, the command devolved on another warrior, Cuseru, called by the Spaniards Captain Cruzero. He established lines of defence on the banks of the Inirida, with a kind of little fort, constructed of earth and timber. The piles were more than sixteen feet high, and surrounded both the house of the *apoto* and a magazine of bows and arrows. Father Forneri has described this building, remarkable in a country in other respects so savage.

The Marepizanas and the Manitivitanoes were the preponderant nations on the banks of the Rio Negro. The former had for it's chiefs, about the year 1750, two warriors called Imu and Cajamu. The king of the Manitivitanoes was Cocuy, famous for his cruelty and his re-

finements in debauchery. His sister was still living in my time, in the vicinity of the mission of Maypures. We smile at hearing, that the names of Cuseru, Imu, and Cocuy are as celebrated in those countries, as the names of Holkar, Tippoo, and the most powerful princes, are in India. The chiefs of the Guaypunabis and the Manitivitanoes fought with small bodies of two or three hundred men; but in their protracted struggles they devastated the missions, where the poor monks had only fifteen or twenty Spanish soldiers at their disposal. These hordes, contemptible for their numbers and means of defence, spread as much terror as armies; and if the Jesuits succeeded in preserving their settlements, it was only by opposing cunning to strength. They attached some powerful chiefs to their interests, and enfeebled the Indians by disunion. When the expedition of Ituriaga and Solano arrived at the Oroonoko, the missions had no longer to fear* the incursions of

* From the year 1733 to 1735 the Caribbee nation was dangerous to the missions of the Lower Oroonoko. It was during this interval, that the missionaries of Mamo, and the bishop, Don Nicolas de Labrid, who had been a canon of the Chapter of Lyons, were massacred by the savages. Father Rotella founded in 1740 the mission of Cabruta, by assembling together the Cabres, to oppose the incursions of the Caribbees. These incursions ceased entirely about the year 1750.

the Caribbees. Cuseru, the chief of the Guaypunabis, had fixed his dwelling behind the granitic mountains of Sipapò. He was the friend of the Jesuits; but other nations of the Upper Oroonoko and the Rio Negro, the Marepizanoes, the Amuizanoes, and the Manitivitanoes, led by Imu, Cajamu, and Cocuy, penetrated from time to time to the north of the Great Cataracts. They had other motives for fighting than that of hatred; they *hunted men*, as was formerly the custom of the Caribbees, and is still the practice in Africa. Sometimes they furnished slaves (*poitos*) to the Dutch or Paranaquiri (*inhabitants of the sea*); sometimes they sold them to the Portugueze or Iaranavi (*sons of musicians*)*. In America, as in Africa, the cupidity of the Europeans has produced the same evils, by exciting the natives to make war, in order to procure slaves†. Every where the contact of nations far different from each other in their degree of civilization leads to the abuse of physical strength, and of intellectual preponderance. The Phœnicians and Carthaginians formerly sought slaves in Europe. Europe now presses in their turn both on the countries where

* The savage tribes designate every commercial nation of Europe by surnames, the origin of which appears altogether accidental. I have already mentioned in another place (vol. iii, p. 268), that the Spaniards were called *clothed men*, *Pongheme* or *Uavemi*, by way of distinction.

† See above, vol. ii, p. 245; and vol. iii, p. 2.

she gathered the first germes of science, and on those where she now almost involuntarily spreads them by carrying thither the produce of her industry.

I have faithfully recorded what I could collect on the state of these countries, where the vanquished nations become gradually extinct, and leave no other signs of their existence than a few words of their language, mixed with that of the conquerors. We have seen, that in the north, beyond the cataracts, the preponderant nations were at first the Caribbees and the Cabres, toward the south, on the Upper Oroonoko, the Guaypunabis; and on the Rio Negro, the Marepizanoes and the Manitivitanoes. The long resistance, which the Cabres, united under a valiant chief, had made to the Caribbees, had become fatal to them subsequent to the year 1720. They at first vanquished their enemies near the mouth of the Rio Caura; and a great number of Caribbees perished in a precipitate flight, between the Rapids of Torno and the *Isla del Infierno.* The prisoners were devoured; and, by one of those refinements of cunning and cruelty, which are common to the savage nations of both Americas, the Cabres spared the life of one Caribbee, whom they forced to climb up a tree to witness this barbarous spectacle, and carry back the tidings to the vanquished. The triumph of Tep, the chief of the Cabres, was but of short

duration. The Caribbees returned in such great numbers, that only a feeble remnant of the anthropophagous Cabres was left on the banks of the Cuchivero.

Cocuy and Cuseru were carrying on a war of extermination on the Upper Oroonoko, when Solano arrived at the mouth of the Guaviare. The former had embraced the cause of the Portugueze; the latter was a friend of the Jesuits, and gave them warning every time that the Manitivitanoes were marching against the Christian establishments of Atures and Carichana. Cuseru made himself a Christian a few days only before his death; but in battle he wore on his left hip a crucifix, which had been given him by the missionaries, and through which he believed himself invulnerable. We were told an anecdote, that paints the violence of his character. He had married the daughter of an Indian chief of the Rio Temi. In a paroxysm of rage against his father-in-law, he declared to his wife, that he was going to fight with him; she reminded him of the courage and singular strength of her father; when Cuseru, without uttering a single word, took a poisoned arrow, and plunged it into her bosom. The arrival of a small body of Spaniards in 1756, under the order of Solano, awakened suspicion in this chief of the Guaypunabis. He was on the point of attempting a contest with

them, when the Jesuits made him sensible, that it would be his interest to remain at peace with the Christians. Cuseru dined at the table of the Spanish general; when he was allured by promises, and the prediction of the approaching fall of his enemies. From being a king he became the mayor of a village; and consented to settle with his people at the new mission of San Fernando de Atabapo. Such is most frequently the sad end of those chiefs, whom travellers and missionaries style Indian princes. "In my mission," says the honest father Gili, "I had five *reyecillos*, or little kings, those of the Tamanacs, the Avarigotes, the Parecas, the Quaquas, and the Méépures. At church I placed them in file on the same bench; but I took care to give the first place to Monaiti, king of the Tamanacs, because he had helped me to found the village; and he seemed quite proud of this precedency." We agree with Father Gili, that it is rare to find men who have fallen from high power so easy to be satisfied.

When Cuseru, the chief of the Guaypunabis, saw the Spanish troops pass the cataracts, he advised Don Jose Solano to wait a whole year before he formed a settlement on the Atabapo; predicting the misfortunes, which were not long in taking place. "Let me labour with my people in clearing the ground," said Cuseru to the Jesuits; "I will plant cassava, and you will find

hereafter wherewith to subsist so many persons." Solano, impatient to advance, refused to listen to the counsel of the Indian chief; and the new inhabitants of San Fernando had to suffer all the evils of scarcity. Canoes were sent at a great expense to New Grenada, by the Meta, and the Vichada, in search of flour. The provision arrived too late, and many Spaniards and Indians perished by those diseases which are produced in every climate by want and moral dejection.

Some traces of cultivation are still found at San Fernando. Every Indian has a small plantation of cacao trees, which produce abundantly the fifth year; but they cease to bear fruit sooner than in the vallies of Aragua. The nut is small, and of an excellent quality. One *almeida*, twelve of which compose a fanega, may be bought at San Fernando for six reals, or nearly four franks; on the coast it costs at least twenty or twenty-five franks; but the whole mission scarcely produces eighty *vanegas* a year; and as the monks of the missions of the Oroonoko and the Rio Negro only trade in cacao, according to an ancient abuse, the Indian is not stimulated to extend this cultivation, which affords him scarcely any benefit. There are some savannahs and good pasturage round San Fernando, but hardly seven or eight cows are to be found, the remains of a considerable herd, which was

brought into these countries at the expedition to the boundaries. The Indians are a little more civilized here than in the rest of the missions; and we found to our surprise a blacksmith of the native race.

What struck us most in the mission of San Fernando, and gives a peculiar physiognomy to the landscape, is the *pihiguao* or *pirijao* palm. It's trunk, armed with thorns, is more than sixty feet high; it's leaves are pinnated, very thin, undulated, and frizled toward the points. Nothing is more extraordinary than the fruits of this tree; every cluster contains from fifty to eighty; they are yellow like apples, grow purple in proportion as they ripen, two or three inches thick, and generally, from abortion, without a kernel. Among the eighty or ninety species of palm trees that are peculiar to the New Continent, which I have enumerated in the *Nova Genera Plantarum æquinoctialium**, there are none in which the sarcocarp is developed in a manner so extraordinary. The fruit of the *pirijao* furnishes a farinaceous substance, as yellow as the yelk of an egg, slightly saccharine, and extremely nutritious. It is eaten like plantains or potatoes, boiled, or roasted in the ashes, and affords an aliment as wholesome as it is agreeable. The Indians and the missionaries

* Vol. i, p. 316.

are unwearied in their praises of this noble palm-tree, which might be called the *peach palm*, and which we found cultivated in abundance at San Fernando, San Balthasar, Santa Barbara, and wherever we advanced toward the south or the east along the banks of the Atabapo and the Upper Oroonoko. In those wild regions are we involuntarily reminded of the assertion of Linnæus, that the country of palm-trees was the first abode of our species, and that man is essentially *palmivorous**. On examining the provision accumulated in the huts of the Indians, we perceive that their subsistence during several months of the year depends as much on the farinaceous fruit of the *pirijao*, as on the cassava and plantain. The tree bears fruit but once a year, but to the amount of three clusters, consequently from one hundred and fifty, to two hundred fruits.

San Fernando de Atabapo, San Carlos, and San Francisco Solano, are the most considerable settlements among the missions of the Upper Oroonoko. We found at San Fernando, as well as in the neighbouring villages of San Balthazar and Javita, pretty parsonage houses, covered by *lianas*, and surrounded by gardens.

† Homo *habitat* intra tropicos, vescitur palmis, lotophagus; *hospitatur* extra tropicos sub novercante Cerere, carnivorus. (*Syst. Nat.*, vol. i, p. 24.)

The tall trunks of the pirijao palms formed in our eyes the most beautiful ornament of these plantations. In our walks, the president of the mission gave us an animated account of his incursions on the Rio Guaviare. He related to us how much these journeys, undertaken "for the conquest of souls," are desired by the Indians of the missions. All, even women and old men, take part in it. On the vain pretext of recovering neophytes who have deserted the village, children above eight or ten years of age are carried off, and distributed among the Indians of the missions as serfs, or *poitoes*. The journals, which father Bartholomew Mancilla kindly communicated to us, contain very valuable geographical materials. I shall give farther on an abstract of these discoveries, in treating of the principal tributary streams of the Oroonoko, which are the Guaviare, the Ventuari, the Meta, the Caura, and the Carony. It will be sufficient here to observe, that, according to the astronomical observations I took on the banks of the Atabapo, and on the western declivity of the Cordillera of the Andes, near the *Paramo de la suma Paz*, the distance is one hundred and seven leagues only from San Fernando to the first villages of the provinces of Caguan and San Juan de los Llanos. I was assured also by some Indians, who dwelt formerly to the west of the Island of Amanaveni,

beyond the confluence of the Rio Supavi, that going in a boat on the Guaviare (in the manner of the savages) beyond the strait (*angostura*) and the principal cataract, they met, at three days distance, bearded and clothed men, who came in search of the eggs of the turtle *terekey*. This meeting affrighted the Indians so much, that they fled precipitately, redescending the Guaviare. It is probable, that these bearded white men came from the villages of Aroma and San Martin, the Rio Guaviare being formed by the union of the rivers Ariari and Guayavero. We must not be surprised, that the missionaries of the Oroonoko and the Atabapo little suspect how near they live to the missionaries of Mocoa, Rio Fragua, and Caguan. In these desert countries, the real distances can be known only by observations of the longitude; and it was in consequence of astronomical data, and the information I gathered in the convents of Popayan and of Pasto, to the west of the Cordillera of the Andes, that I formed an accurate idea of the respective situations of the Christian settlements on the Atabapo, the Guayavero, and the Caqueta*.

Every thing changes on entering the Rio Atabapo; the constitution of the atmosphere, the colour of the waters, and the form of the

* The Caqueta bears lower down the name of the Yupurà.

trees that cover the shore. You no longer suffer during the day the torment of moschettoes ; and the gnats with long legs (*zancudoes*) become rare during the night. Beyond the mission of San Fernando these nocturnal insects disappear altogether. The waters of the Oroonoko are turbid, and loaded with earthy matter ; and in the coves, from the accumulation of dead crocodiles and other putrescent substances, diffuse a musky and faint smell. We were sometimes obliged to strain this water through a linen cloth before we drank it. The waters of the Atabapo on the contrary are pure, agreeable to the taste, without any trace of smell, brownish by *reflected*, and of a pale yellow by *transmitted* light. The people call them light, in opposition to the heavy and turbid waters of the Oroonoko. Their temperature is generally two degrees, and when you appproach the mouth of the Rio Temi three degrees, cooler than the temperature of the Upper Oroonoko. After having been compelled during a whole year to drink water at 27° or 28°*, a lowering of a few degrees in the temperature produces a very agreeable sensation. I think this lowering of the temperature may be attributed to the river being less broad, and without the sandy beach, the heat of which at the Oroonoko is by day

* 22·4° or 22·8° of Reaumur.

more than 50°, and also to the thick shade of the forests, which are traversed by the Atabapo, the Temi, the Tuamini, and the Guainia, or Rio Negro.

What proves the extreme purity of the black waters is their limpidity, their transparency, and the clearness with which they reflect the images and colours of surrounding objects. The smallest fish are visible in them at a depth of twenty or thirty feet; and most commonly the bottom of the river may be distinguished, which is not a yellowish or brownish mud, like the colour of the water, but a quartzose and granitic sand of dazzling whiteness. Nothing can be compared to the beauty of the banks of the Atabapo. Loaded with plants, among which rise the palms crowned with leafy plumes; the banks are reflected in the waters; and the verdure of the reflected image seems to have the same vivid hue as the object itself directly seen, the surface of the fluid is so homogeneous, smooth, and destitute of that mixture of suspended sand and decomposed organic matter, which roughens and streaks the surface of less limpid rivers.

On quitting the Oroonoko, several small rapids must be passed, but without any appearance of danger. Amid these *raudalitos*, according to the opinion of the missionaries, the Rio Atabapo falls into the Oroonoko. I rather think, that the Atabapo falls into the Guaviare;

and that the part of the river, which we meet with from the Oroonoko as far as the mission of San Fernando, ought to bear this name. The Rio Guaviare, which is much wider than the Atabapo, has white waters, and in the aspect of it's banks, it's fishing-birds, it's fish, and the great crocodiles which live in it, resembles the Oroonoko much more than that part of the latter river which comes from the Esmeralda. When a river springs from the junction of two other rivers, nearly alike in size, it is difficult to judge which of the two confluent streams must be regarded as it's source. The Indians of San Fernando still maintain an opinion diametrically opposite to that of the geographers. They affirm, that the Oroonoko rises from two rivers, the Guaviare and the Rio Paragua. They give this latter name to the Upper Oroonoko, from San Fernando and Santa Barbara to beyond the Esmeralda. According to this hypothesis they say, that the Cassiquiare is not an arm of the Oroonoko, but of the Rio Paragua. In looking on the map I have traced, it may be perceived, that these denominations are entirely arbitrary. It is of little import, that the name of Oroonoko is refused to the Rio Paragua, provided we trace the course of these rivers such as it is in nature, and do not separate by a chain of mountains, as was done previously to my travels, rivers that communicate together, and

form one system. When we would give the name of a large river to one of the two branches by which it is formed, it should be applied to that branch, which furnishes most water. Now at the two seasons of the year when I saw the Guaviare, and the Upper Oroonoko or Rio Paragua (between the Esmeralda and San Fernando), it appeared to me, that the latter was not so large as the Guaviare. Similar doubts have been entertained by geographical travellers on the junction of the Upper Mississipi with the Missouri and the Ohio, on the junction of the Maragnon with the Guallaga and the Ucayale, and on the junction of the Indus with the Chunab (Hydaspes of Cashmere) and the Gurra, or Sutledge*. To avoid embroiling farther a nomenclature of rivers so arbitrarily fixed, I will not propose new denominations. I shall continue with father Caulin and the Spanish geographers, to call the river Esmeralda the Oroonoko, or Upper Oroonoko; but I must observe, that if the Oroonoko, from San Fernando de Atabapo as far as the Delta which it forms opposite the island of Trinidad, were regarded as the continuation of the Rio Guaviare; and if

* The Hydaspes is properly a tributary stream of the Chunab or Acesines. The Sutledge, or Hysudrus forms, together with the Beyah or Hyphases, the river Gurra. These are the beautiful regions of the Pundjab and Douab, celebrated in history from Porus down to Sultan Acbar.

that part of the Upper Oroonoko between the Esmeralda and the mission of San Fernando were considered as a tributary stream; the Oroonoko would preserve, from the savannahs of San Juan de los Llanos and the eastern declivity of the Andes to it's mouth, a more uniform and natural direction, that from south west to north-east.

The Rio Paragua, or that part of the Oroonoko which you go up to the east of the mouth of the Guaviare, has clearer, more transparent, and purer water than the part of the Oroonoko below San Fernando. The waters of the Guaviare, on the contrary, are white and turbid; they have the same taste, according to the Indians, whose organs of sense are extremely delicate and well practised, as the waters of the Oroonoko near the Great Cataracts. "Bring me the waters of three or four great rivers of these countries," an old Indian of the mission of Javita said to us, "on drinking them I will tell you without fear of mistake, whence the water was taken; whether they come from a white or black river; the Oroonoko or the Atabapo, the Paragua or the Guaviare." The great crocodiles and porpoises (*toninas*), which are alike common in the Rio Guaviare and the Lower Oroonoko, are entirely wanting, as we were told, in the Rio Paragua (or Upper Oroonoko, between San Fernando and the Esmeralda). These

are very remarkable differences in the nature of the waters, and the distribution of animals! The Indians do not fail to cite them, when they would prove to travellers, that the Upper Oroonoko, to the east of San Fernando, is a distinct river that falls into the Oroonoko, and that the real origin of the latter must be sought in the sources of the Guaviare. The geographers of Europe are no doubt in the wrong not to embrace the way of thinking of the Indians, who are the geographers of their own country; but in respect to nomenclature and orthography, it is often prudent, to follow an error we have pointed out.

The astronomical observations* made in the night of the 25th of April did not give me the latitude with satisfactory precision. The sky was cloudy, and I could obtain only a few heights of α Centauri, and the beautiful star at the foot of the Southern Cross. According to these heights, the latitude of the mission of San Fernando appeared to me to be 4° 2′ 48″. In father Caulin's map, founded on the observations of Solano made in 1756, it is 4° 1′†. This

* See my *Rec. d' Obs. Astro.*, vol. i, p. 230, 253, 275.

† In the text of the book, which, as it happens unfortunately for the most part in narratives of travels, is in contradiction with the map, the latitude of the junction of the Guaviare and the Atabapo is said to be a little less than three degrees. Does not this difference proceed from the falsified

agreement proves the justness of a result, which however I could only deduce from altitudes considerably distant from the meridian. A good observation of the stars at Guapasoso* gave me 4° 2′ for San Fernando de Atabapo. (Gumilla placed the confluence of the Atabapo and the Guaviare in 0° 30′; D'Anville, in 2° 51′.) I was able to fix the longitude with much more precision in my way to the Rio Negro, and in returning from that river. It is 70° 30′ 46″ (or 4° 0′ west of the meridian of Cumana). The going of the chronometer was so regular during the navigation in a boat, that from the 16th of April to the 9th of July it varied only from 27·9″, to 28·5″. At San Fernando de Atabapo I found the dip of the magnetic needle, rectified with great care, to be 29·7° cent. div.; the intensity of force 219. The angle and the oscillations therefore had diminished considerably from Maypures, in a difference of latitude of 1° 11′. The surround-

copies of Solano's observations which have been circulated? Gili mentions an instance in the latitude of Atures, which led him into error in all the more southern points. (*Saggio*, vol. 1, p. 320; and above, p. 12, note.)

* *Obs. Astr.* vol. 1, p. 263. The longitude of San Fernando has been given in Arrowsmith's map as I published it (68° 10′ from Greenw.), but the latitude is laid down at 4° 19′. In this point, as in so many others, the calculations of d'Anville on the longitude have been happier than those of his successors.

ing rock was no longer a ferruginous sandstone, but granite passing into gneiss.

April 26th. We advanced only two or three leagues, and passed the night on a rock near the Indian plantations or *conucos* of Guapasoso. The river losing itself by it's inundations in the forests, and it's real banks being unseen, the traveller can set his foot on the land only where a rock or a small table-land rises above the water. The granite of those countries, by the disposition which the thin laminæ of black mica affect, sometimes resembles graphic granite; but most frequently, and this determines the age of it's formation, it passes into a real gneiss. It's beds, very regularly stratified, run from south-west to north-east, as in the Cordillera on the shore of Caraccas. The dip of the granite-gneiss is 70° north-west. It is traversed by an infinite number of veins of quartz, which are singularly transparent, and three or four, and sometimes fifteen inches thick. I found no cavity, (*druse*,) no crystallized substance, not even rock-crystal; and no trace of pyrites, or any other metallic substance. I enter into these particulars on account of the chimerical ideas, that have been spread ever since the sixteenth century, after the voyages of Berreo and Raleigh*, " on the immense riches of the great and fine empire of Guyana."

* Raleigh's work bears the pompous title of " The Disco-

The river Atabapo displays every where a peculiar aspect; you see nothing of it's real banks formed by flat lands, eight or ten feet high; they are concealed by a row of palms, and small trees with slender trunks, the roots of which are bathed by the waters. There are many crocodiles from the point where you quit the Oroonoko to the mission of San Fernando, and their presence indicates, as we have said above, that this part of the river belongs to the Rio Guaviare and not to the Atabapo. In the real bed of the latter river, above the mission of San Fernando, there are no longer any crocodiles: we find there some *bavas*, a great many *fresh-water dolphins*, but no manatees. We also seek in vain on those banks the thick-nosed tapir, the araguates, or great howling monkeys, the zamuro, or vultur aura, and the crested pheasant, known by the name of *guacharaca*. Enormous water-snakes, in shape resembling the boa, are unfortunately very common, and are dangerous to the Indians who bathe. We saw them almost from the first day, swimming by the side of our canoe; they were at the most twelve or fourteen feet long. The jaguars of the banks of the Atabapo and the Temi are

very of the large, rich, and beautiful Empire of Guiana. Lond. 1596." (See also Raleghi admiranda Descriptio Regni Guianæ, Auri abundantissimi. Ed. Hondius Noribergæ, 1599).

large and well fed; they are said, however, to be less daring than the jaguars of the Oroonoko.

April 27th. The night was beautiful, dark clouds passed from time to time over the zenith with extreme rapidity. Not a breath of wind was felt in the lower strata of the atmosphere; the breeze existed only at the height of a thousand toises. I dwell upon this peculiarity; for the movement we saw was not produced by the counter-currents (from west to east), which are sometimes thought to be observed in the torrid zone on the loftiest mountains of the Cordilleras; it was the effect of a real breeze, of an east wind. I had some good observations of the meridian altitude of α in the Southern Cross; the partial results oscillated only eight or ten seconds round the *mean**. The latitude of Guapasoso is 3° 53′ 55″. The black water of the river served me for an horizon, and I felt so much the more pleasure in making these observations, as in the white rivers, the Apure and the Oroonoko, we had been cruelly stung by insects, Mr. Bonpland in marking the time by the chronometer, and I in levelling the horizon. We left the *conucos* of Guapasoso at two o'clock; continued to ascend the river toward the south, and found it, or rather that part of it's bed which is free from trees, narrowing more and

* *Obs. Astr.* vol. 1, p. 233.

more. It began to rain toward sunrise. Unaccustomed to these forests, which are less inhabited by animals than those of the Oroonoko, we were almost surprised to hear no longer the howlings of the monkeys. The dolphins, or *toninas,* sported by the side of our boat. According to the relation of Mr. Colebrooke, the *delphinus gangeticus,* which is the fresh-water porpoise of the ancient continent, in like manner accompanies the boats that go up toward Benares; but from Benares to the point where the Ganges receives the salt waters is only two hundred leagues, while from the Atabapo to the mouth of the Oroonoko is more than three hundred and twenty.

Near noon we passed the mouth of the little river Ipurichapano on the east, and afterward, the granitic pass, known by the name of *Piedra del Tigre.* This solitary rock is only sixty feet high, yet it enjoys great celebrity in these countries. Between four and five degrees of latitude, a little to the south of the mountains of Sipapo, we reach the southern extremity of that *chain of cataracts,* which I proposed, in a memoir published in 1800, to call the *Chain of Parima.* At 4° 20′ it stretches from the right bank of the Oroonoko toward the east and east-south-east. The whole of the land extending from the mountains of the Parima toward the river of Amazons, which is traversed by the Atabapo, the Cassi-

quiare, and the Rio Negro, is an immense plain, covered partly with forests, and partly with grasses. Small rocks rise here and there like castles. We regretted, that we had not stopped to rest near the rock of the Tiger; for in going up the Atabapo we had great difficulty to find a spot of dry ground, open and spacious enough to light fires, and place our instruments and our hammocks.

April 28th. It rained hard from sunset, and we were afraid that our collections would be damaged. The poor missionary had his fit of tertian fever, and besought us to reembark immediately after midnight. We passed at daybreak the *Piedra* and the *Raudalito** of Guarinuma. The rock is on the east bank; it is a bare shelf of granite covered with psora, cladonia, and other lichens. I fancied myself transported to the north of Europe, and on the ridge of the mountains of gneiss and granite between Freiberg and Marienburg in Saxony. The cladonias appeared to me to be identical with the lichen rangiferinus, the l. pixidatus, and the l. polymorphus of Linneus. After having passed the rapids of Guarinuma, the Indians showed us in the middle of the forest, on our right, the ruins of the mission of Mendaxari, which has been long abandoned. On the east bank, near the little

* The rock and little cascades.

rock of Kemarumo, in the midst of Indian plantations, a gigantic bombax* attracted our curiosity. We landed in order to measure it; the height was nearly one hundred and twenty feet, and the diameter between fourteen and fifteen. This enormous effort of vegetation surprised us the more, as we had till then seen on the banks of the Atabapo only small trees with slender trunks, which from afar resembled young cherry trees. The Indians assured us, that these small trees do not form a very extensive group. They are checked in their growth by the inundations of the river; while the dry grounds near the Atabapo, the Temi, and the Tuamini, furnish excellent timber for building. These forests however, (and this observation is important, if we wish to form a precise idea of *the equatorial plains of the Rio Negro,* and the Amazon) do not stretch indefinitely to the east and west toward the Cassiquiare and the Guaviare; they are bounded by the open savannahs of Manuteso, and the Rio Inirida. We found it difficult in the evening to stem the current, and passed the night in a wood a little above Mendaxari; which is another granitic rock traversed by a stratum of quartz. We found in it a group of fine crystals of black schorl.

April 29th. The air was cooler. We had

* Bombax ceiba.

no zancudoes, but a sky constantly clouded, and without stars. I began to regret the Lower Oroonoko. We still advanced slowly from the force of the current, and stopped a great part of the day in seeking for plants. It was night when we arrived at the mission of San Balthasar, or, as the monks say, (Balthasar being only the name of an Indian chief,) at the mission of *la divina Pastora de Balthasar de Atabapo.* We were lodged with a Catalan missionary, a lively and agreeable man, who displayed in these wild countries the activity that characterizes his nation. He had planted a fine garden, where the fig-tree of Europe was found in company with the persea, and the lemon-tree with the mammee. The village was built with that regularity, which in the north of Germany, and in protestant America, we find in the hamlets of the Moravian brethren; and the Indian plantations seemed better cultivated than elsewhere. Here we saw for the first time that white and fungous substance, which I have made known by the name of *dapicho* and *zapis**. We immediately perceived, that it was analogous to the *elastic resin;* but, as the Indians made us understand by signs, that it was found under ground, we were inclined to think, till

* These two words belong to the Poimisano and Paragini tongues. (Pronounce it *dapitcho.*)

we arrived at the mission of Javita, that the *dapicho* was a fossil caoutchouc, though different from the elastic bitumen of Derbyshire. A Poimisano Indian, seated by the fire, in the hut of the missionary, was employed in reducing the *dapicho* into black caoutchouc. He had spitted several bits on a slender stick, and was roasting them like meat. The *dapicho* blackens in proportion as it grows softer, and gains in elasticity. The resinous and aromatic smell, which filled the hut, seemed to indicate, that this coloration is the effect of the decomposition of a carburet of hydrogen, and that the carbon appears in proportion as the hydrogen burns at a low heat*. The Indian beat the softened and blackened mass with a piece of brazil wood, ending in form of a club; he then kneaded the *dapicho* into balls of three or four inches in diameter, and let it cool. These balls exactly resemble the caoutchouc of the shops, but their surface remains in general slightly viscous. They are used at San Balthasar in the Indian game of tennis, which is so celebrated among the inhabitants of Uruana and Encaramada; they are cut into cylinders, to be used as corks, and are far preferable to those made of the bark of the cork-tree.

* See Mr. Allen's Memoir. (*Journal de Phys.*, vol. xvii, p. 77.)

This use of the caoutchouc appeared to us the more worthy notice, as we had been often embarrassed by the want of the corks of Europe. The great utility of cork is felt only in countries, where trade has not supplied this bark in plenty. Equinoctial America no where produces, not even on the back of the Andes, an oak resembling the quercus suber; and neither the light wood of the bombax, the ochroma*, and other malvaceous plants, nor the *rhachis* of maize, of which the natives make use, can well supply the place of our corks. The missionary showed us, before the *Casa de los Solteros* (the house where the young unmarried men reside), a drum, which was a hollow cylinder of wood, two feet long, and eighteen inches thick. This drum was beaten with great masses of *dapicho*, which served as drum-sticks; it had openings which could be stopped by the hand at will, to vary the sounds, and was fixed on two light supports. Savage nations love noisy music; the drum, and the *botutos*, or trumpets of baked earth, in which a tube of three or four feet long communicates with several swellings, are indispensable instruments among the Indians for their grand pieces of music.

April 30th. The night was sufficiently fine for observing the meridian heights of α of the

* *Palo de Valza.*

Southern Cross, and the two large stars in the feet of the Centaur. I found the latitude of San Balthasar 3° 14′ 23″. Horary angles of the Sun gave 70° 14′ 21″ for the longitude by the chronometer. The dip of the magnetic needle was 27·8° (cent. div.). We left the mission at a late hour in the morning, and continued to go up the Atabapo for five miles; then, instead of following that river to it's source in the east, where it bears the name of Atacavi, we entered the Rio Temi. Before we reached it's confluence, a granitic hummock, that rises on the western bank, near the mouth of the Guasacavi, fixed our attention; it is called the *Rock of the Guahiba woman**, or the Rock of the Mother, *Piedra de la Madre*. We inquired the cause of so singular a denomination. Father Zea could not satisfy our curiosity; but some weeks after, another missionary, one of the predecessors of this ecclesiastic, whom we found settled at San Fernando as president of the missions, related to us an event, which I recorded in my journal, and which excited in our minds the most painful feelings. If, in these solitary scenes, man scarcely leaves behind him any trace of his existence, it is doubly humiliating for a European to see perpetuated by the name of a rock, by one of those imperishable monu-

* *Piedra de la Guahiba.*

ments of nature, the remembrance of the moral degradation of our species, and the contrast between the virtue of a savage, and the barbarism of civilized man!

In 1797 the missionary of San Fernando had led his Indians to the banks of the Rio Guaviare, on one of those hostile incursions, which are prohibited alike by religion and the Spanish laws. They found in an Indian hut a Guahiba mother with three children, two of whom were still infants. They were occupied in preparing the flour of cassava. Resistance was impossible; the father was gone to fish, and the mother tried in vain to flee with her children. Scarcely had she reached the savannah, when she was seized by the Indians of the mission, who go to *hunt men*, like the Whites and the Negroes in Africa. The mother and her children were bound, and dragged to the bank of the river. The monk, seated in his boat, waited the issue of an expedition, of which he partook not the danger. Had the mother made too violent a resistance, the Indians would have killed her, for every thing is permitted when they go to the conquest of souls (*à la conquista espiritual*), and it is children in particular they seek to capture, in order to treat them in the mission as *poitos*, or slaves of the Christians. The prisoners were carried to San Fernando in the hope, that the mother would be unable to find her way back

to her home by land. Far from those children who had accompanied their father on the day in which she had been carried off, this unhappy woman showed signs of the deepest despair. She attempted to take back to her family the children, who had been snatched away by the missionary; and fled with them repeatedly from the village of San Fernando, but the Indians never failed to seize her anew; and the missionary, after having caused her to be mercilessly beaten, took the cruel resolution of separating the mother from the two children, who had been carried off with her. She was conveyed alone toward the missions of the Rio Negro, going up the Atabapo. Slightly bound, she was seated at the bow of the boat, ignorant of the fate that awaited her; but she judged by the direction of the Sun, that she was removing farther and farther from her hut and her native country. She succeeded in breaking her bonds, threw herself into the water, and swam to the left bank of the Atabapo. The current carried her to a shelf of rock, which bears her name to this day. She landed, and took shelter in the woods, but the president of the missions ordered the Indians to row to the shore, and follow the traces of the Guahiba. In the evening she was brought back. Stretched upon the rock (*la Piedra de la Madre*) a cruel punishment was inflicted on her with those straps of manatee

leather, which serve for whips in that country, and with which the alcades are always furnished. This unhappy woman, her hands tied behind her back with strong stalks of *mavacure*, was then dragged to the mission of Javita.

She was there thrown into one of the caravanseras that are called *Casa del Rey*. It was the rainy season, and the night was profoundly dark. Forests till then believed to be impenetrable separated the mission of Javita from that of San Fernando, which was twenty-five leagues distant in a straight line. No other path is known than that of the rivers; no man ever attempted to go by land from one village to another, were they only a few leagues apart. But such difficulties do not stop a mother, who is separated from her children. Her children are at San Fernando de Atabapo; she must find them again, she must execute her project of delivering them from the hands of Christians, of bringing them back to their father on the banks of the Guaviare. The Guahiba was carelessly guarded in the caravansera. Her arms being wounded, the Indians of Javita had loosened her bonds, unknown to the missionary and the alcades. She succeeded by the help of her teeth in breaking them entirely; disappeared during the night; and at the fourth rising Sun was seen at the mission of San Fernando, hovering around the hut where her children were

confined. "What that woman performed," added the missionary, who gave us this sad narrative, "the most robust Indian would not have ventured to undertake. She traversed the woods at a season, when the sky is constantly covered with clouds, and the Sun during whole days appears but for a few minutes. Did the course of the waters direct her way? The inundations of the rivers forced her to go far from the banks of the main stream, through the midst of woods where the movement of the waters is almost imperceptible. How often must she have been stopped by the thorny lianas, that form a network around the trunks they entwine! How often must she have swum across the rivulets, that run into the Atabapo! This unfortunate woman was asked how she had sustained herself during four days? She said, that exhausted with fatigue, she could find no other nourishment than those great black ants called *vachacos*, which climb the trees in long bands, to suspend on them their resinous nests." We pressed the missionary to tell us, whether the Guahiba had peacefully enjoyed the happiness of remaining with her children; and if any repentance had followed this excess of cruelty. He would not satisfy our curiosity; but at our return from the Rio Negro we learnt, that the Indian mother was not allowed time to cure her wounds, but was again separated from

her children, and sent to one of the missions of the Upper Oroonoko. There she died, refusing all kind of nourishment, as the savages do in great calamities.

Such is the remembrance annexed to this fatal rock, to the *Piedra de la Madre.* In the relation of my travels I feel no propensity to pause at a picture of individual calamity, of evils which are every where frequent, where there are masters and slaves, civilized Europeans living with people in a state of barbarism, and priests executing the plenitude of arbitrary power on men ignorant and without defence. Historian of the countries through which I passed, I generally confine myself to pointing out what is imperfect, or fatal to humanity, in their civil or religious institutions. If I have dwelt longer on the *Rock of the Guahiba*, it was to display an affecting instance of maternal tenderness in a race of people so long calumniated; and because I thought some benefit might accrue from publishing a fact, which I had from the monks of St. Francis, and which proves how much the system of the missions calls for the care of the legislator.

Above the mouth of the Guasucavi we entered the Rio Temi, the course of which is from south to north. Had we continued to ascend the Atabapo, we should have turned toward the east-south-east, going farther from

the banks of the Guainia or Rio Negro. The Temi is only eighty or ninety toises broad, but in any other country than Guiana would be still a considerable river. The aspect of the country is uniform, a forest covering ground perfectly flat. The fine *pirijao* palm, with it's fruit like peaches, and a new species of *bache* or mauritia, it's trunk bristled with thorns, rise amid smaller trees, the vegetation of which appears to be retarded by the continuance of the inundations. This mauritia aculeata is called by the Indians *juria* or *cauvaja;* it's leaves are in the form of a fan, and bent toward the ground ; at the centre of every leaf, no doubt from the effect of some disease of the parenchyma, concentric circles of alternate blue and yellow appear, the yellow prevailing toward the middle. We were singularly struck by this appearance; the leaves, coloured like the peacock's tail, are supported by short and very thick trunks. The thorns are not slender and long like those of the corozo and other thorny palm trees; but on the contrary very woody, short, and broad at the base, like the thorns of the hura crepitans. On the banks of the Atabapo and the Temi, this palm tree is distributed in groups of twelve or fifteen stems, as close together as if they rose from the same root. These trees resemble in their appearance, form, and scarcity of leaves, the fan-palms and palmettoes of the ancient continent. We re-

marked, that some plants of the *juria* were entirely destitute of fruit, and others exhibited a considerable quantity; this circumstance seems to indicate a palm-tree of separate sexes.

Wherever the Rio Temi forms coves, the forest is inundated to the extent of more than half a league square. To avoid the sinuosities of the river, and shorten the navigation, it is here performed in a very extraordinary manner. The Indians made us leave the bed of the river; and we went up toward the south, across the forest, through paths (*sendas*), that is, through open channels of four or five feet broad. The depth of the water seldom exceeds half a fathom. These *sendas* are formed in the inundated forest like paths on dry ground. The Indians, in going from one mission to another, pass with their boats as much as possible by the same way; but the communications not being frequent, the force of vegetation sometimes produces unexpected obstacles. An Indian furnished with a *machette,* (a great knife the blade of which is fourteen inches long), stood at the head of our boat, employed continually in chopping off the branches, that cross each other from the two sides of the channel. In the thickest part of the forest we were astonished by an extraordinary noise. On beating the bushes a shoal of *toninas* (fresh water dolphins) four feet long surrounded our boat. These animals had concealed themselves beneath the

branches of a fromager or bombax ceiba. They fled across the forest, throwing out those spouts of compressed air and water, which have given them in every language the name of *blowers*. How singular was this spectacle in the middle of the land, three or four hundred leagues from the mouths of the Oroonoko and the Amazon? I am not ignorant, that the pleuronectes* of the Atlantic go up the Loire as far as Orleans; but I persist in thinking, that the dolphins of the Temi, like those of the Ganges, and like the skate (*raia*) of the Oroonoko, are of species essentially different from the dolphins and skates of the ocean. In the immense rivers of South America, and the great lakes of North America, Nature seems to repeat several pelagic forms. The Nile has no porpoises†: those of the sea go up the Delta no farther than Biana and Metonbis toward Selamoun.

At five in the evening we regained with some difficulty the real bed of the river. Our canoe remained fast some minutes between two trunks of trees; and was scarcely disengaged, when we reached a spot where several paths or small

* Dabs.

† Those dolphins, that enter the mouth of the Nile, had however, so much struck the ancients, that in a bust in syenite, preserved in the museum at Paris, (hall of Melpomene, No. 266) the sculptor has represented them half concealed in the undulatory beard of the god of the river.

channels crossed each other. The pilot was puzzled to distinguish the most open path. We have mentioned above, that in the province of Varinas you travel in a boat across open savannahs from San Fernando de Apure as far as the banks of the Arauca; here we navigated through a forest so thick, that we could guide ourselves neither by the sun nor by the stars. We were again struck during this day by the want of arborescent ferns in that country; they diminish visibly from six degrees of north latitude, while the palm-trees augment prodigiously toward the equator. Fern-trees belong to a climate less hot, and a soil a little mountainous, to table-lands three hundred toises high. It is only where there are mountains, that these majestic plants descend toward the plains; they seem to flee from perfectly flat grounds, as those through which run the Cassiquiare, the Temi, Inirida, and the Rio Negro. We passed in the night near a rock, called the *Piedra de Astor* by the missionaries. The ground from the mouth of the Guaviare constantly displays the same geological constitution. It is a vast granitic plain, in which from league to league the rock pierces the soil, and forms not hillocks, but small masses, that resemble pillars or ruined buildings.

May the 1st. The Indians chose to depart long before sunrise. We were stirring before

them however, because I waited though vainly for a star ready to pass the meridian. In those humid regions covered with forests, the nights became more obscure in proportion as we drew nearer the Rio Negro, and the interior of Brazil. We remained in the bed of the river till day-break, afraid of losing ourselves among the trees. At sunrise we again entered the inundated forest, to avoid the force of the current. Arrived at the junction of the Temi with another little river, the Tuamini, the waters of which are equally black, we followed the latter toward the south-west. This direction led us near the mission of Javita, which is founded on the banks of the Tuamini; and at this Christian settlement we were to find the aid necessary for transporting our canoe by land to the Rio Negro. We did not arrive at San Antonio de Javita till near eleven in the morning. An accident of small importance in itself, but which shows the excessive timidity of the little sagoins, had retained us some time at the mouth of the Tuamini. The noise of the blowers had frightened our monkeys, and one of them fell into the water. As the animals of this species, perhaps on account of their extreme meagreness, swim badly, it was saved with some difficulty.

At Javita we had the pleasure of finding a very intelligent and affable monk. We were

obliged to remain four or five days at his mission. This delay was inevitable for transporting our boat across the *portage* of Pimichin; and we availed ourselves of it, not only to visit the surrounding country, but also to cure ourselves of an evil, which we had suffered for two days. We felt an extraordinary irritation on the joints of the fingers, and on the back of our hands. The missionary told us it was caused by the *aradores* (ploughman insects), which get under the skin. We could distinguish with a lens nothing but streaks, or parallel and whitish furrows. It is the form of these furrows, that has obtained this insect the name of *ploughman*. A mulatto woman was sent for, who boasted of being thoroughly acquainted with all the little insects, that burrow in the human skin; the *chego*, the *nuche*, the *coya*, and the *arador*; she was the *curandera*, the physician of the place. She promised to extirpate the insects, that caused this smarting irritation, one by one. She heated at a lamp the point of a little bit of very hard wood, and dug with this point the furrows that marked the skin. After long researches, she announced with the pedantic gravity peculiar to the mulatto race, that an *arador* was found. I saw a little round bag, which I suspected to be the egg of an acarus. I was to find relief, when the mulatto woman had succeeded in taking out three or four of these *aradores*.

Having the skin of both hands filled with acari, I had not patience to wait the end of an operation, which had already lasted till late at night. The next day an Indian of Javita cured us radically, and with surprising promptitude. He brought us the branch of a shrub, called *uzao*, with small leaves like those of cassia, very coriaceous and glossy. He made a cold infusion of the bark of this shrub, which had a bluish colour, and the taste of liquorice (*glycyrrhiza*). When beaten, it yields a great deal of froth. The irritation of the *aradores* ceased by using simple lotions of this *uzao* water. We could not find this shrub in flower, or bearing fruit; it appears to belong to the family of the leguminous plants, the chemical properties of which are singularly varied. We dreaded so much the sufferings to which we had been exposed, that we constantly kept some branches of the *uzao* in our boat, till we reached San Carlos. This shrub grows in abundance on the banks of the Pimichin. Why has no remedy been discovered for the irritation produced by the sting of the *zancudoes* (culex), as well as for that occasioned by the *aradores* or microscopic acari?

In 1755, before the expedition to the boundaries, better known by the name of the expedition of Solano, the whole country between the missions of Javita and San Balthasar was regarded as dependant on Brazil. The Portu

gueze had advanced from the Rio Negro, by the portage of Canno Pimichin, as far as the banks of the Temi. An Indian chief of the name of Javita, celebrated for his courage and his spirit of enterprise, was the ally of the Portugueze. He pushed his hostile incursions from the Rio Jupura, or Caqueta, one of the great tributary streams of the Amazon, by the rivers Uaupe and Xiè as far as the black waters of the Temi and the Tuamini, a distance of more than a hundred leagues. He was furnished with a patent, which authorised him, "to draw the Indians from the forest, for the conquest of souls." He availed himself amply of this permission; but his incursions had an object, which was not altogether spiritual, that of making slaves (*poitos*), to sell to the Portugueze. When Solano, the second chief of the expedition of the boundaries, arrived at San Fernando de Atabapo, he had captain Javita seized, in one of his incursions to the banks of the Temi. He treated him with gentleness, and succeeded in gaining him over to the interests of the Spanish government by promises, that were not fulfilled. The Portugueze, who had already formed some stable settlements in these countries, were driven back as far as the lower part of the Rio Negro; and the mission of San Antonio, of which the more usual name is Javita, after that of it's Indian founder, was removed farther north of

the sources of the Tuamini, to the spot where it is now found. This old captain, Javita, was still living, when we proceeded to the Rio Negro. He is an Indian of great vigour of mind and body. He speaks Spanish with facility, and has preserved a certain influence over the neighbouring nations. As he attended us in all our herborizations, we obtained from his own mouth information so much the more useful, as the missionaries have great confidence in his veracity. He assured us, that in his youth he had seen almost all the Indian tribes, that inhabit the vast regions between the Upper Oroonoko, the Rio Negro, the Inirida, and the Jupura, eat human flesh. The Daricavanas, the Puchirinavis, and the Manitibitanoes, appeared to him to be the greatest cannibals among them. He believes, that this abomiable practice is with them the effect of a system of vengeance; they eat only enemies, who are made prisoners in battle. The instances where, by a refinement of cruelty, the Indian eats his nearest relations, his wife, an unfaithful mistress, are, as we shall see below, extremely rare. The strange custom of the Scythians and Massagetes, the Capanaguas of the Rio Ucayale, and the ancient inhabitants of the West India islands, of honoring the dead by eating a part of the corpse, is unknown on the banks of the Oroonoko. In both continents this feature of manners belongs

only to nations, that hold in horror the flesh of a prisoner. The Indian of Haïti (Saint Domingo) would think he was wanting to the memory of a relation, if he had not thrown into his drink a small portion of the body of the deceased, after having dried it like one of the mummies of the Guanches, and reduced it to powder*. This gives us just occasion, to repeat with an eastern poet, " of all animals man is the most fantastic in his manners, and the most disorderly in his propensities."

The climate of the mission of San Antonio de Javita is extremely rainy. When you have passed the latitude of three degrees north, and approach the equator, you have seldom an opportunity of observing the sun or the stars. It rains almost the whole year, and the sky is constantly cloudy. As the breeze is not felt in this immense forest of Guyana, and the refluent polar currents do not reach it, the column of air that reposes on this wooded zone is not renewed by dryer strata. Saturated with vapours†, it condenses them into equatorial rains. The missionary assured us, that it often rained here four or five months without cessation. I measured the water that fell on the first of May in the space of five hours; it was twenty one

* Bembo, *Hist. Venet.*, book 6, vol. i, p. 219.

† See chap. 18, vol. iv, p. 409.

lines in height. The third of May I even collected fourteen lines in three hours. It must be remarked, that these observations were not made during a shower, but in an ordinary rain. It is well known, that at Paris there fall only twenty-eight or thirty lines of water in whole months, even in the most rainy*, in March, July, and September. I am not ignorant, that with us also showers have happened, during which the rain has amounted to more than an inch in an hour†, but we must compare only the mean state of the atmosphere in the temperate and torrid zones. It appears to result from observations, which I made successively at the foot of Guayaquil, on the shore of the South-sea, and in the town of Quito at one thousand four hundred and ninety-two toises height, that there falls ordinarily two or three times less water in an hour on the back of the Andes, than at the level of the Ocean. It rains oftener in the mountains, but there falls less water at once, in a given time. The sky is sensibly more serene on the banks of the Rio Negro, at Maroa, and at San Carlos, than at Javita and on the

* Arago, in the *Annales de Physique*, vol. iii, p. 441; vol. vi, p. 440; vol. ix, 430; vol. xii, p. 422.

† The rain fell thirteen inches two lines in eighteen hours at Viviere, and one inch one line in one hour at Montpellier. (*Ann. de Phys.*, vol. viii, p. 437; and Poitevin, Essay on the Climate of Languedoc, *Journ. de Phys.*, vol. lx, p. 391.)

banks of the Temi. I attribute this difference to the proximity of the savannahs of the Lower Guainia, which permits the free access of the breeze, and which also by their radiation cause a stronger ascendant current than lands covered with forests.

The temperature of Javita* is cooler than that of Maypures, but considerably hotter than that of the Guainia or Rio Negro. The centigrade thermometer kept up in the day to twenty-six or twenty-seven degrees; and in the night to twenty-one degrees. The diurnal heat north of the cataracts, and particularly, north of the mouth of the Meta, was generally twenty-eight or thirty degrees, and the nocturnal heat twenty-five or twenty-six degrees. This diminution of heat on the banks of the Atabapo, the Tuamini, and the Rio Negro, is no doubt owing to the long absence of the Sun, a sky constantly cloudy, and the evaporation of a humid soil. I do not speak of the refrigerant influence of the forests, as furnishing in their innumerable leaves so many thin substances, that grow cool by ra-

* The 1st of May, at 19^h in the morning, therm. of Reaumur, 17·7°; hygr. of whalebone, 61°; cloudy: at noon th. 21·9°; hygr. 48°; sky serene: at 4^h 30′, th. 19·8°; hygr. 55·5°: at 7^h, th. 20·2°; hygr. 60°: at 10^h, th. 19°; hygr. 62°; cloudy: at 11^h, th. 18·2°; hygr. 65°. The 3d of May, at 20^h, th. 19°; hygr. 63°; cloudy: at 0^h, th. 21·5°; hygr. 49°; clear: at 3^h 15′, th. 22°; hygr. 46·5°: at 8^h, th. 20·2°; hygr. 61°; cloudy.

diating toward the sky. This effect must be scarcely sensible on account of the cloudy state of the atmosphere. It appears also, that the elevation of the site of Javita contributes to the coolness of the climate. Maypures is probably from sixty to seventy toises above the level of the ocean, San Fernando de Atabapo one hundred and twenty-two toises, and Javita one hundred and sixty-six toises. The little atmospheric tides varying on the coast (at Cumana) from one day to another from 0·8 of a line to two lines, and I having unfortunately broken the instrument before I again reached the shore, I am not quite sure of these results. In making observations at Javita on the horary variations of the atmospheric pressure, I discovered, that a small bubble of air intercepted* a part of the column of mercury, and modified by it's thermometric dilatation, the effects of the tides. In wretched boats, and encumbered as we were, it was almost impossible to hold the barometer in a vertical position, or much inclined. I took advantage of our stay at Javita to re-

* I relate this minute circumstance, to remind travellers how necessary it is, to have barometers, the tube of which is visible throughout it's whole length. A very small bubble of air may intercept half, or even the whole of the column of mercury, without the sound of the mercury striking against the extremity of the tube being changed.

adjust and verify the instrument. It marked*, after I had well rectified the level, 325·4 lines, at the temperature of 25·4°, at half after eleven in the morning. I attach some importance to this observation, because, in order to know the configuration of a continent, it is more useful to determine the height of plains two or three hundred leagues distant from the coast, than to measure the peaks of the Cordilleras. A barometric determination made at Sego on the Niger, at Bornou, or on the table lands of Khoten and of Hami, would be more interesting for geology than the measurement of the mountains of Abyssinia and of Musart. The horary variations of the barometer take place in the forests of Javita at the same hours as on the coast, and at the farm of Antisana, where my instrument was suspended at the height of two thousand one hundred and four toises. They were from nine in the morning till four in the afternoon 1·6 line. The 4th of May they were even nearly two lines. The hygrometer of Deluc, reduced to that of Saussure, kept

* The remark made on the correction of the basin (chap. 17, vol. iv, p. 378, note) is applicable to the heights which I have indicated, vol. iv, p. 455, 555, and 572; and p. 85 of the present volume. These heights indicate only relative differences. I believe I have estimated a little too high (*Obs. Astr.*, vol. i, p. 298) the absolute elevation of Maypures.

constantly in the shade, reckoning only the observations made at periods when it did not rain, between eighty-four and ninety-two degrees. The humidity had consequently much augmented beyond the Great Cataracts, and in the middle of a continent shaded by forests, and watered by equatorial rains, it was almost as great as on the ocean*.

From the 30th of April to the 11th of May, I had not been able to see any star in the meridian, to determine the latitude of places. I watched whole nights in order to make use of the method of double altitudes; but all my efforts were useless. The fogs of the north of Europe are not more constant than those of the equatorial regions of Guyana. On the 4th of May, I saw the sun for some minutes; and found by the chronometer and the horary angles the longitude of Javita to be 70° 22′, or 1° 15′ farther west than the longitude of the junction of the Apure with the Oroonoko. This result is interesting for laying down on our maps the unknown country lying between the Xiè and the sources of the Issana, placed on the same meridian with the mission of Javita. The dip of the magnetic needle at this mission was 26·4° (cent. div.); it had consequently diminished

* See above, vol. ii, p. 90; and p. 85 of the present volume.

5·85°, from the great northern cataract, in a difference of latitude of 2° 50′. The diminution of the intensity of the magnetic force was not less sensible. This, which at Atures amounted to two hundred and twenty-three oscillations, was expressed at Javita by only two hundred and eighteen oscillations in 10′ of time.

The Indians of Javita, to the number of one hundred and sixty, now belong for the most part to the nations of the Poimisanoes, the Echinavis, and the Paraginis; and are employed in the construction of boats. These are formed of the trunks of a large species of laurel, called *sassafras** by the missionaries, which are hollowed by the joint means of fire and the hatchet. These trees are more than one hundred feet high; the wood is yellow, resinous, almost incorruptible in the water, and has a very agreeable smell. We saw them at San Fernando, at Javita, and more particularly at Esmeralda, where the greatest number of the canoes of the Oroonoko are constructed, because the adjacent forests furnish the largest trunks of *sassafras*. The Indians are paid a piastre the half toise, or *vara*, of the bottom of the boat (which is the trunk hollowed); a boat therefore of sixteen

* Ocotea *cymbarum*, very different from the laurus sassafras of North-America. (See our *Nov. Gen. et Spec.*, vol. ii, p. 166.) The laurus *javitensis* is also employed in the construction of canoes.

varas long costs, for the purchase of the wood, and the labour of the carpenter, only sixteen piastres; but the nails, and the fitting up of the gunwales, by which the boat is enlarged, double the price. At the Upper Oroonoko I have seen forty piastres, or two hundred franks, given for a canoe forty-eight feet long.

The forest, between Javita and the *Canno* Pimichin, affords an immense quantity of gigantic trees, ocoteas and real laurels (the third group of the laurineæ, the persea, has been found wild only above one thousand toises of height), the amasonia arborea *, the retiniphyllum secundiflorum †, the curvana, the jacio ‡, the iacifate, of which the wood is red like the brasilletto, the guamufate with it's fine leaves of calophyllum from seven to eight inches long, the amyris caranna, and the mani. All these trees (with the exception of our new genus retiniphyllum) were more than one hundred or one

* This is a new species of the genus taligalea of Aublet. On the same spot grow the bignonia *magnoliæfolia*, b. *jasminifolia*, solanum *topiro*, justicia *pectoralis*, faramea *cymosa*, piper *javitense*, scleria *hirtella*, echites *javitensis*, lindsea *javitensis*, and that curious plant of the family of the *verbenaceæ*, which I have dedicated to an illustrious scientific gentleman, Leopold von Buch, in whose first labours I participated. (See *Nov. Gen.* vol. ii, p. 270, pl. 132, buchia plantaginea.)

† See our *Plant. Equin.*, vol. 1, p. 86, tab. 25.

‡ A species of siphonia, perhaps the hevea of Aublet.

hundred and ten feet high. Their trunks throwing out branches only toward the summit, we had some trouble in procuring at the same time leaves and flowers. The latter were frequently strewed upon the ground at the foot of the trees; but, the plants of different families being grouped together in these forests, and every tree being covered with lianas, it appeared dangerous to rely on the sole authority of the natives, when they assured us, that a flower belonged to such or such a tree. Amid these riches of nature herborizations caused us more chagrin than satisfaction. What we could gather appeared to us little interesting, compared to what we could not reach. It rained unceasingly during several months, and Mr. Bonpland lost the greater part of the specimens, which he had been compelled to dry by artificial heat. Our Indians named the trees, as usual, on chewing the wood. They distinguished the leaves better than the corollæ or the fruit. Occupied in seeking timber for building (trunks for canoes), they are little attentive to the flowers. "All those great trees bear neither flowers nor fruits," the Indians repeated unceasingly. Like the botanists of antiquity they denied, what they had not taken the trouble to observe. They were tired with our questions, and exhausted our patience in turn.

We have mentioned above, that, the same chemical properties being sometimes found in

the same organs of different families of plants, these families supply the place of each other in various climates. Several species of palms * furnish the equinoctial inhabitants of America and Africa with oil, which we draw from the olive. What the coniferæ are to the temperat zone, the terebinthaceæ and the guttiferæ are to the torrid. In the forests of those burning climates, where there is neither pine, nor thuya, nor taxodiums, nor even a podocarpus, resins, balsams, and aromatic gums are furnished by the maronobeas, the icicas, and the amyrises. The collecting of these gummy and resinous substances is an object of trade in the village of Javita. The most celebrated resin bears the name of *mani;* and of this we saw masses of several hundred weight, resembling colophony and mastic. The tree which is called *mani* by the Paraginis, and which Mr. Bonpland believes

* In Africa, the elais or maba; in America the cocoa-tree. (See above, vol. iii, p. 202). In the cocoa-tree it is the perisperm; and in the elais (as in the olive, and the oleineæ in general) it is the sarcocarp, or the pulp of the pericarp, that yields oil. This difference, observed in the same family, appears to me very remarkable, though it is in no way contradictory to the results obtained by Mr. de Candolle in his ingenious researches on the chemical properties of plants. If our alfonsia oleifera belong to the genus elais, as Mr. Brown with great reason believes ("Plants of Congo," p. 37), it follows, that in the same genus the oil is found in the sarcocarp and in the perisperm.

to be the moronobea coccinea, furnishes but a small quantity of the substance employed in the trade with Angostura. The greatest part comes from the *mararo* or *caragna*, which is an amyris. It is remarkable enough, that the name *mani*, which Aublet heard from the Galibis* of Cayenne, was again found by us at Javita, three hundred leagues distant from French Guyana. The moronobea or symphonia of Javita yields a yellow resin; the *caragna*†, a resin strongly odoriferous, and white as snow; the latter becomes yellow, where it is adherent to the internal part of old bark.

We went every day to see if our canoe advanced on the *portages*. Twenty-three Indians

* The *Galibis* or *Caribis* (the *r* has been changed into *l*, as often happens) are of the great stock of the Caribbee nations. The products useful in commerce and in domestic life have received the same denomination in every part of America, which this warlike and commercial people have overrun. (*See above*, vol. iii, p. 284).

† *Caranna.* Are not the substances known by this name at the Oroonoko partly gums? I was assured at Esmeralda, that savage nations, living to the east of the high mountain of Duida, eat the *caranna*. This name is given to very different plants. I regret not having been able to make any chemical researches on the nature of the juices, which transude from the trees of the Oroonoko. The resins belong principally to the coniferæ and the terebinthaceæ; the gum-resins (cambogia, assafœtida) to the guttiferæ and the umbelliferæ; and the gums to the leguminaceæ and the rosaceæ.

were employed in dragging it by land, placing branches of trees to serve as rollers. A small boat passes in a day, or a day and half, from the waters of the Tuamini to those of *Canno* Pimichin, which flow into the Rio Negro. Our canoe being very large, and having to pass the cataracts a second time, it was necessary to avoid with particular care any friction on the bottom. In consequence the passage lasted more than four days. It is only since 1795 that a road has been traced through the forest. The Indians of Javita performed the half of this labour; the other half was the task of the Indians of Maroa, Davipe, and San Carlos. This road, measured by means of a cord of a hundred *varas*, was found by father Eugenio Cereso to be seventeen thousand one hundred and eighty *varas** long. By substituting a canal for this *portage*, as I proposed to the ministry of King Charles the Fourth, the communication between the Rio Negro and Angostura †, between the Spanish Oroonoko and the Portugueze possessions on the Amazon, would be singularly facilitated. Boats coming from San Carlos would no longer proceed by the Cassiquiare, which is full of windings, and dreaded for the strength of it's current; they would no longer go down the Oroonokò

* According to Antilla, 1 vara 0·83 of a metre.

† See pages 168, and 198 of the present volume.

from it's bifurcation to San Fernando de Atabapo; they would only have to go up a distance half as long as by the Rio Negro and the Canno Pimichin. When arrived at the new canal of Javita, they would descend by the Tuamini, the Temi, the Atabapo, and the Oroonoko, as far as Angostura. This voyage from the frontiers of Brazil to the capital of Guyana might, I believe, be easily performed in twenty-four or twenty-six days; it is in ordinary weather ten days shorter, and less fatiguing for the rowers (*bogas*), because the struggle against the currents is one half less than in proceeding by the Cassiquiare*,

* In the present state of things (without the canal that I projected being traced) boats have come from the fort of San Carlos on the Rio Negro to Angostura, by the Canno Pimichin, not as Father Caulin says, in ten days, but in twenty-three or twenty-four. The following is the conclusion I made from my own experience, compared with the statements of the missionaries. You may go, under circumstances moderately favorable,

By the portage of Pimichin,	days	*By the Cassiquiare,*	days
From St. Carlos to Javita in	4	From St. Carlos to the bifurcation in	11
From Javita to San Fernando	3	From the bifurcation, to San Fernando	5
From San Fernando to Carichana	9	From San Fernando to Atures	4
From Carichana to Angostura	12	From Atures to Angostura	17
From San Carlos to An-		From San Carlos to An-	

But to ascend the Oroonoko, and go from Angostura to the Rio Negro, the difference of time employed would be but a few days, since the traveller must then go up the little rivers, by the Pimichin, while by the old way he descends the Cassiquiare. It may be conceived, that the rapidity of this voyage from the mouth of the Oroonoko to San Carlos depends on several variable circumstances, on the force of the breeze that blows from Angostura to Carichana, the state of the cataracts of Atures and Maypures, and the greater or less fulness of the beds of the rivers. The breeze is pretty fresh during the months of November and December, and the force of the current of the Oroonoko is not con-

	days		days
gostura, by going down the little rivers Temi and Atabapo	28	gostura, by going up the Cassiquiare	37

To ascend the Oroonoko, takes 1st, by the Pimichin, and going up the little rivers from Angostura to Carichana, fifteen days; from Carichana to San Fernando, thirteen days; from S. Fernando to S. Carlos, seven days; in all thirty-five days; 2dly, by going down the Cassiquiare from Angostura to San Fernando, twenty-eight days; from S. Fernando to the bifurcation, nine days; from the bifurcation to San Carlos, five days; in all forty-two days. The swellings of the Oroonoko and the Cassiquiare, with the force of the currents, change all the results of these estimations. The missionaries believe the navigation from S. Carlos to Angostura, by the Cassiquiare, to be five hundred leagues. I have noticed above, that it is only three hundred and ten leagues.

siderable; but the small rivers at this period have so little water, that every minute there is a risk of taking the ground. The missionaries prefer making this voyage in the month of April, the time of the harvest of turtle's eggs, which animates a part of the banks of the Oroonoko. The moschettoes are then less dreaded, the river is half full, the breeze is still available, and the Great Cataracts may be passed with facility.

The barometric heights * observed at the mission of Javita, and at the landing place at Pimichin, prove, that the general slope of the canal would be thirty or forty toises from north to south. Accordingly the great number of small streams, across which the boats must be conveyed in the *portage*, all flow toward the Pimichin. We saw with astonishment among these rivulets of *black water* there are some, the water of which, seen by reflected light, were as white as those of the Oroonoko. What can be the cause of this difference? All these springs rise in the same savannahs, in the same marshes of the forest. The measurement made by father Cereso not being in a right line, and it's direction inclining too much toward the east, the

* At Javita, bar. corrected May the 4th, at 9^h in the evening, 325·5 lines; at 11^h 326·1 lines. Therm. from 18° to 19° of Reaumur. At the landing place at Pimichin, May the 6th, at 11 in the morning, 328·3 lines; th. 20·3° of Reaumur.

canal would not be six thousand toises long. I traced the shortest way by means of the compass, and some marks were made in the oldest trees of the forest. The ground is perfectly level; and for five leagues round there is not the smallest hill. In the present state of things, the *portage* should be facilitated by improving the road, by giving it the proper direction, by drawing the canoes on carriages, and by throwing bridges over the rivulets, which sometimes stop the Indians for whole days.

In this forest we at length obtained precise information respecting the pretended fossil caoutchouc, called *dapicho* by the Indians. The old captain Javita led us to the brink of a rivulet, which runs into the Tuamini; and showed us, that, after digging two or three feet deep, in a marshy soil, this substance was found between the roots of two trees known by the name of the *jacio*, and the *curvana*. The first is the hevea of Aublet, or siphonia of the modern botanists, known to furnish the caoutchouc of commerce in Cayenne and the Grand Para; the second has pinnate leaves, and it's juice is milky, but very thin, and almost destitute of viscosity. The *dapicho* appears to be the result of an extravasation of the sap from the roots. This extravasation takes place more especially when the trees have attained a great age, and the interior of the trunk begins to decay. The bark and al-

burnum crack; and thus is effected naturally, what the art of man performs to collect in abundance the milky juices of the hevea, the castilloa, and the caoutchouc fig-tree. Aublet relates, that the Galibis and the Garipons of Cayenne begin by making a deep incision at the foot of the trunk, so as to penetrate into the wood; soon after they join with this horizontal notch others both perpendicular and oblique, reaching from the top of the trunk nearly to the roots. All these incisions conduct the milky juice towards one point, where the vase of clay is placed, in which the caoutchouc is to be deposited. We saw the Indians of Carichana operate nearly in the same manner.

If, as I suppose, the accumulation and overflowing of the milk in the *jacio* and the *curvana* be a pathologic phenomenon, it must sometimes take place at the extremity of the longest roots, for we found masses of *dapicho* of two feet in diameter, and four inches thick, eight feet distant from the trunks. Sometimes you dig in vain at the foot of dead trees, at others the *dapicho* is found beneath the hevea or jacio still green. The substance is white, corky, fragile, and resembles by it's laminated structure and undulating edge the boletus igniarius. The *dapicho* perhaps takes a long time to form; it is probably a juice thickened by a particular disposition of the vegetable organs, diffused and

coagulated in a humid soil secluded from the contact of light *; it is caoutchouc in a particular state, I had almost said an etiolated caoutchouc. The humidity of the soil seems to account for the undulating form of the edges of the *dapicho*, and it's division into layers.

I often observed at Peru, that on pouring slowly the milky juice of the hevea, or the sap of the carica, into a large quantity of water, the *coagulum* forms undulating outlines. The *dapicho* is certainly not peculiar to the forest that extends from Javita to Pimichin, although this is the only spot, where it has hitherto been found. I have no doubt, that on digging in French Guyana beneath the roots and the old trunks of the hevea, those enormous masses of corky caoutchouc †, which I have just described, would from time to time be found. As it is observed in Europe, that at the fall of the leaf the sap is conveyed toward the root, it would be curious to examine, whether, within the tropics, the milky juices of the urticeæ, the

* See vol. iv, p. 225.

† Thus at five or six inches depth between the roots of the hymenea courbaril masses of the resin *anime* (erroneously called *copal*) are discovered. They are sometimes taken for amber found in inland places. This phenomenon seems to throw some light on the origin of those large masses of *electrum*, which are picked up from time to time on the coast of Prussia. (*Schweigger Beob.*, 1819, p. 104.)

euphorbiaceæ, and the apocyneæ, descend also at certain seasons. Notwithstanding a great equality of temperature, the trees of the torrid zone follow a cycle of vegetation, of changes periodically returning. The existence of the *dapicho* is more interesting to physiology, than to vegetable chemistry. Mr. Allen has published a memoir on the difference observable between the caoutchouc in it's ordinary state, and the substance from Javita, which I sent to Sir Joseph Banks. A yellowish white caoutchouc is now to be found in the shops, which may be easily distinguished from the *dapicho*, because it is neither dry like cork, nor friable, but extremely elastic, glossy, and soapy. I lately saw considerable quantities of it in London, the price of which varied from six to fifteen franks a pound. This caoutchouc, white, and greasy to the touch, is prepared in the East Indies. It exhales that animal and fetid smell, which I have attributed in another place to a mixture of *caseum* and albumen.* When

* The pellicles, which the milk of hevea in contact with the atmospheric oxygen deposits, become brown on exposure to the sun. If the *dapicho* grow black as it is softened before the fire, it is from a slight combustion, from a change in the proportion of its elements. I am surprised, that some chemists consider the black caoutchouc of the shops as mixed with soot, as blackened by the smoke to which it has been exposed. (*Thomson's Chemistry*, 1818, vol. iv, p. 197.)

we reflect on the immense variety of plants in the equinoctial regions, that are capable of furnishing caoutchouc, it is to be regretted, that this substance, so eminently useful, is not found among us at a lower price. Without cultivating trees with a milky sap, a sufficient quantity of caoutchouc might be collected in the missions of the Oroonoko alone for the consumption of civilized Europe*. In the kingdom of

* We saw in Guyana, beside the *jucio* and the *curvana*, two other trees, that yield caoutchouc in abundance; on the banks of the Atabapo, the *guamaqui* with jatropha leaves, (perhaps the bagassa of Aublet, pl. 376); and at Maypures the *cime*. Researches on plants that are useful in physic or the arts are of such general interest, that I venture to record them in this work. I published in my third volume, chap. vi, p. 31, the results of my experiments on the cinchona, and other plants possessing the *febrifuge principle*. I shall here give a sketch of the plants of the two hemispheres, which are capable of furnishing caoutchouc more or less abundantly; *euphorbiaceæ;* hevea guyanensis (siphonia caoutchouc), commiphora madagascariensis, excæcaria agallocha, hura crepitans, mabea piriri, omphalia diandra, euphorbia purpurea, sapium aucuparium, plukenetia verrucosa: *urticeæ;* cecropia peltata, artocarpus integrifolia, several species of ficus (f. religiosa, f. anthelmintica, f. toxicaria), ambora tambourissa, bagassa guyannensis, brosimum alicastrum: *apocyneæ;* urceola elastica, vahea madagascariensis, some species of asclepias: *campanulaceæ;* lobelia caoutchouc (*Nov. Gen.*, vol. iii, p. 304.) I might have added several *papaveraceæ* and *sapoteæ*, for there is no milky plant, that does not contain some trace of caoutchouc. It is said, that Mr. Benjamin Barton Smith has extracted at

New Grenada some successful attempts have been made, to fabricate boots and shoes of this substance without a seam. Among the American nations the Omaguas of the Amazon best understand how to manufacture caoutchouc.

Four days had passed, and our canoe had not yet arrived at the landing place of Rio Pimichin. "You want for nothing in my mission," said father Cereso, "you have plantains and fish; at night you are not stung by moschettoes; and the longer you stay, the better chance you will have of seeing the stars of my country. If your boat be destroyed in the portage, we will give you another; and I shall have had the satisfaction of passing some weeks

Philadelphia a great deal of caoutchouc from the smilax caduca. (*Phil. Mag.* vol. xl, p. 66.) This fact appears very extraordinary, if we recollect the properties of the other smilaceæ. It would be the first instance of caoutchouc in a monocotyledonous plant. After so many researches as have been made latterly by botanical travellers, it were much to be wished, that our chemical treatises were less inaccurate in the indication of plants, that furnish resins, gums, balsams, and colouring matter. We find constantly under the article caoutchouc the hevea and the jatropha elastica mentioned as two different trees. Such of this elastic substance as is found in the shops is the produce of the hevea, or the siphonia cahuchu of Guyana and Brazil, of the lobelia caoutchouc of Popayan, of the castilloa elastica of Mexico, of the ficus and the urceola elastica (a genus of Roxburgh nearly approaching the vahea) of India, and of the commiphora of Madagascar.

*con gente blanca y de razon.**" Notwithstanding our impatience, we listened with interest to the information given us by the worthy missionary. It confirmed all we had already heard of the moral state of the natives of those countries. They live distributed in hordes of forty or fifty, under a family government; and recognize a common chief (*apoto, sibierene*) only at the moment when they make war against their neighbours. The mistrust of these hordes toward one another is so much stronger, as those who live in the nearest neighbourhood speak languages altogether different. In the open plains, or the countries with savannahs, the tribes are fond of choosing their habitations from an affinity of origin, and a resemblance of manners and idioms. On the table-land of Tatary, as in North America, great families of nations have been seen, united in several columns, to push their migrations across countries little wooded, and easily traversed. Such were the journeys of the Toltec and Aztec race in the high plains of Mexico from the sixth to the eleventh century of our era; such probably was also the movement of nations, by which the petty tribes of Canada were grouped together. the Mengwe†, or five nations, the Algonquins

* "With white and rational people." European self-love usually opposes the *gente de razon* to the *gente parda.*

† Iroquois.

or Lenni-Lenapes*, the Chickasaws, and the Muskogees†. As the immense country between the equator and the eighth degree of north latitude forms but one forest, the hordes were there dispersed by following the branchings of rivers, and the nature of the land compelled them to become more or less agriculturists. Such is the labyrinth of these rivers, that families settled themselves without knowing what race of men lived nearest the spot. In Spanish Guyana a mountain, a forest half a league broad, sometimes separates hordes, that would require two days of navigation to meet. It is thus that the communication of rivers in open countries, or in a state of advanced civilization, contributes powerfully to generalize languages, manners, and political institutions; but in the impenetrable forests of the torrid zone, as in the first rude condition of our species, they increase the dismemberment of great nations, favor the transition of dialects into languages that appear to us radically distinct, and cherish national hatred and mistrust. Between the banks of the

* From the word *lenno* (native) has been formed Illenoh, and Illinois, the name of the great nation described by La Hontan. (Philad. Historical Trans., 1819, p. 404.)

† I might have designated the stock of this nation by the name of Natchez. It is the language of this extinct tribe, that is the mother tongue of the idioms of Florida, and of the southern tribes beyond the Alleghany mountains.

Caura and the Padamo every thing bears the stamp of disunion and weakness. Men avoid because they do not understand each other; they mutually hate, because they mutually fear.

When we examine attentively this wild part of America, we fancy ourselves transported to those primitive times, when the Earth was peopled by degrees; and seem to be present at the birth of human societies. In the ancient world we see pastoral life prepare the hunting nations for agriculture. In the new we seek in vain these progressive developments of civilization, these moments of repose, these stages in the life of nations. The luxury of vegetation embarrasses the Indians in the chace; and their rivers resembling arms of the sea, the depth of the waters prevents fishing during whole months. Those species of ruminating animals, that constitute the wealth of the nations of the ancient world, are wanting in the new. The bison and the musk ox have never been reduced to a domestic state; the breeding of llamas and guanacoes has not given birth to the habits of pastoral life. In the temperate zone, on the banks of the Missouri, as well as on the table-land of New-Mexico, the American is a hunter; but in the torrid zone, in the forests of Guyana, he cultivates cassava, plantains, and sometimes maize. Such is the admirable fertility of nature, that the field of the native is a little spot of land; to clear which requires only

setting fire to the brambles, and putting a few seeds or slips into the ground is all the husbandry it demands. If we go back in thought to the most remote ages, in these thick forests we must always figure to ourselves nations drawing the greatest part of their nourishment from the earth; but, as this earth produces abundance in a small space, and almost without toil, we must also represent to ourselves these nations as often changing their dwelling along the banks of the same river. In fact, even now the native of Oroonoko travels with his seeds; and transports his farm (*conuco*), as the Arab transports his tent, and changes his pasturage. The number of cultivated plants, which are found wild amid the woods, proves the nomade habits of an agricultural people. Can we be surprised, that from these habits they lose almost all the advantages, that result in the temperate zone from stationary culture, from that of corn*, which requires extensive lands, and the most assiduous labour?

The nations of the Upper Oroonoko, the Atabapo, and the Inirida, like the ancient Germans and the Persians, have no other worship than that of the powers of nature. They call the good principle *Cachimana;* it is the *Manitou*, the Great Spirit, that regulates the seasons, and

* See vol. iii, p. 13.

favors the harvests. By the side of *Cachimana* there is an evil principle, *Iolokiamo*, less powerful, but more artful, and in particular more active. The Indians of the forest, when they visit occasionally the missions, conceive with difficulty the idea of a temple or an image. "These good people," said the missionary, like "only processions in the open air. When I last celebrated the patron festival of my village, that of San Antonio, the Indians of Inirida were present at mass. 'Your God,' said they to me, 'keeps himself shut up in a house, as if he were old and infirm; ours is in the forest, in the fields, and on the mountains of Sipapu, whence the rains come.'" Among the more numerous, and on this account less barbarous tribes, religious societies of a singular kind are formed. Some old Indians pretend, to be better instructed than others in what regards the divinity; and to them is confided the famous *botuto*, of which I have spoken, and which is sounded under the palm-trees, that they may bear abundance of fruit. On the banks of the Oroonoko there exists no idol, as among all the nations who have remained faithful to the first worship of nature, but the *botuto*, the sacred trumpet, is become an object of veneration. To be initiated into the mysteries of the *botuto*, it is requisite to have pure manners, and to have lived single. The initiated are subjected to flagellations, fast-

ings, and other painful exercises. There are but a small number of these sacred trumpets. The most anciently celebrated is that upon a hill near the confluence of the Tomo and the Guainia. It is pretended, that it is heard at once on the banks of the Tuamini, and at the mission of San Miguel de Davipe, a distance of ten leagues. Father Cereso assured us, that the Indians speak of the *botuto* of Tomo as an object of worship common to many surrounding tribes. Fruit and intoxicating liquors are placed by the sacred trumpet. Sometimes the Great Spirit (*Cachimana*) himself makes the *botuto* resound; sometimes he is content to manifest his will by him, to whom the keeping of the instrument is entrusted. These juggleries being very ancient (from the fathers of our fathers, say the Indians), we must not be surprised, that some incredulous are already to be found; but these express their disbelief of the mysteries of the *botuto* only in whispers. Women are not permitted to see this marvellous instrument; and are excluded from all the ceremonies of this worship. If a woman have the misfortune to see the trumpet, she is put to death without mercy. The missionary related to us, that in 1798 he was happy enough to save a young girl, whom a jealous and vindictive lover accused of having followed from a motive of curiosity the Indians, who sounded the *botuto* in the planta-

tions. "They would not have murdered her publicly," said father Cesero, "but how was she to be protected from the fanaticism of the natives, in a country where it is so easy to give poison? The young girl told me of her fears, and I sent her to one of the missions of the Lower Orooonoko." If the people of Guyana had remained masters of that vast country; if, without having been impeded by Christian settlements, they could follow freely the development of their barbarous institutions; the worship of the *botuto* would no doubt become of some political importance. That mysterious society of the initiated, those guardians of the sacred trumpet, would be transformed into a ruling cast of priests, and the oracle of Tomo would gradually form a link between the bordering nations. It is thus that community of worship (*communia sacra*), religious ceremonies, and mysteries, have drawn together, pacified, and perhaps civilized so many nations of the ancient continent*.

In the evening of the 4th of May we were informed, that an Indian, who assisted in dragging our bark over the *portage* of Pimichin, had been stung by a viper. He was a tall strong man, and was brought to the mission in a very alarming state. He had dropped down senseless; and nausea, vertigo, and congestions in the

* *Heeren, Gesch. der Staaten des Alterthums*, 1799, p. 15, 71, 143.

head, had succeeded the fainting. The liana called *vejuco du guaco* *, which Mr. Mutis has rendered so celebrated, and which is the most certain remedy for the bite of venomous serpents, is yet unknown in these countries. A number of Indians hastened to the hut of the sick man, and he was cured with an infusion of *raiz de mato*. We cannot indicate with certainty what plant furnishes this counterpoison. Travelling botanists feel too often great regret at not seeing in flower or in fruit the plants that are most useful to man, while so many species little remarkable for their properties are displayed daily before our eyes with all the parts of fructification. I am inclined to think, that the *raiz de mato* is an apocynea, perhaps the cerbera thevetia, called by the inhabitants of Cumana *lingua de mato*, or *contra-culebra*, and which they also use against the bite of serpents. A genus nearly approaching the cerbera † is employed in India for the same purpose. It is common enough to meet in

* It is a mikania, which was confounded for some time in Europe with the ayapana. Mr. Bonpland has given the first figure of it in our *Plantæ Equinoct.* vol. ii, p. 84, tab. 105, (*Nov. Gen.*, vol. 4, p. 107.) Mr. de Candolle thinks, that the *guaco* may be the eupatorium satureiæfolium of Lamarck (*Encyclop. Bot.*, vol. ii, p. 411); but this eupatorium differs by it's lineary leaves, while the mikania guaco has triangular, oval, and very large leaves. (*De Cand., Propr. med.*, p. 180.)

† Ophioxylon serpentinum.

the same family of plants with vegetable poisons, and antidotes against the venom of reptiles. As a great number of tonics and narcotics are antidotes more or less active, we find these in families very different* from each other, in the aristolochiæ, the apocyneæ, the gentianæ, the polygalæ, the solaneæ, the compositæ, the malvaceæ, the drymyrhizeæ, and, which is still more surprising, even in the palm-trees.

In the hut of the Indian, who had been dangerously bitten by a viper, we found balls two or three inches in diameter of an earthy and impure salt, called *chivi*, which is prepared with great care by the natives. At Maypures a conferva is burnt, which is left by the Oroonoko on the neighbouring rocks, when, after high swellings, it again enters it's bed. At Javita a salt is fabricated by the incineration of the *spadix* and fruit of the palm-tree *seje* or *chimu*†. This fine palm-tree, which abounds on the banks of the Auvana, near the cataract of Guarinuma, and

* I shall mention as examples of these nine families; aristolochia anguicida, cerbera thevetia, ophiorhiza mungos, polygala senega, nicotiana tabacum, (one of the remedies most used in Spanish America), mikania guaco, hibiscus abelmoschus (the seeds of which are very active,) lanpujum rumphii, and kunthia montana (*Canna de la Vibora*). *Nov. Gen.*, vol. i, p. 303.

† See above, p. 152. At the Rio Negro a salt is obtained from the spathe of another palm-tree, called *chiquichiqui*.

between Javita and the *canno* Pimichin, appears to be a new species of cocoa-tree. It may be recollected, that the fluid contained in the fruit of the common cocoa-tree is often saline, even when the tree grows far from the seashore. At Madagascar salt is extracted from the sap of a palm-tree called *cira* *. Beside the *spadix* and the fruit of the *seje* palm, the Indians of Javita lixiviate also the ashes of the famous liana called *cupana*, which is a new species of the genus paullinia, consequently a very different plant from the cupania of Linneus. I shall mention on this occasion, that a missionary seldom travels without being provided with some prepared seeds of the *cupana*. This preparation requires great care. The Indians scrape the seeds, mix them with flour of cassava, envelop the mass in plantain leaves, and set it to ferment in water, till it acquires a saffron-yellow colour. This yellow paste dried in the sun, and diluted in water, is taken in the morning as a kind of tea. This beverage is bitter and stomachic, but appeared to me to have a very disagreeable taste.

On the banks of the Niger, and in a great part of the interior of Africa, where salt is extremely rare, it is said of a rich man, "he is so happy as to eat salt at his meals." This happiness is not too common in the interior of Guy-

* *Jacquin, Hort. Schoenb.*, vol. i, p. x.

ana. The whites only, particularly the soldiers of the little fort of San Carlos, know how to procure pure salt, either from the coast of Caraccas, or from Chita * by the Rio Meta. Here, as throughout America, the Indians eat little meat, and consume scarcely any salt; the salt-duty therefore produces little profit to the revenue, even where the number of natives is very considerable, for instance, at Mexico and Guatimala. The *chivi* of Javita is a mixture of muriat of potash and of soda, of caustic lime, and of several other earthy salts †. The Indians dissolve a few particles in water, fill with this solution a leaf of heliconia folded in a conical form, and let drop a little, as from the extremity of a filter, on their food.

May the 5th. We set off, to follow on foot our canoe, which had arrived at length by the *portage* at Canno Pimichin. We had to ford a great number of streams; and those passages require some caution, on account of the vipers with which the marshes abound. The Indians pointed out to us on the moist clay the traces of the little black bears, which are so common on the banks of the Temi. They differ at least in

* North of Morocote, at the eastern declivity of the Cordillera of New Grenada. The salt of the coasts, which the Indians call *yuquira*, costs two piastres the *almuda* at San Carlos.

† Compare Azzara, *Voy. au Paraguay*, vol. i, p. 55.

size from the *ursus americanus;* the missionaries call them *osso carnicero,* to distinguish them from the *osso palmero* or tamanoir (myrmecophaga jubata), and from the *osso hormigero,* or anteater tamandua. These animals are good to eat; the first two defend themselves by rising on their hind feet. The tamanoir of Buffon is called *uaraca* by the Indians; it is irascible and courageous, which is extraordinary in an animal without teeth. We found, as we advanced, some vistas in the forest, which appeared to us so much the richer, as it became more accessible. We here gathered some new species of coffee (the American tribe, with flowers in panicles, forms probably a particular genus); the galega piscatorum, of which the Indians make use, as they do of jacquinia, and of a composite plant of the Rio Temi, as a kind of *barbasco,* to intoxicate fish*; and finally, the liana, known in those countries by the name of *vejuco de mavacure,* which yields the famous poison curare. It is neither a phyllanthus, nor a coriaria, as Mr. Wildenouw thought, but, according to Mr. Kunth's researches, very probably a strychnos. We shall have occasion farther on, to speak of this venomous substance, which is an important object of trade among the savages. If a travel-

* *Kunth,* in the *Nov. Gen.,* vol. iii, p. 371. The composite of the Temi is the baillieria *barbasco.* (Ibid. vol. iv, p. 226.)

ler, favoured like us by the hospitality of the missionaries, were to remain one year on the banks of the Atabapo, the Tuamini, and the Rio Negro, and another year in the mountains of Esmeralda and the Upper Oroonoko, he would no doubt triple the number of genera described by Aublet and Mr. Richard.

The trees of the forest of Pimichin preserve the gigantic height of eighty or one hundred and twenty feet. In these burning climates the laurineæ and amyris* furnish that fine timber for building, which, on the north-west coast of America, on mountains where the thermometer falls in winter to 20° cent. below nought, we find in the family of the coniferæ. Such in every zone, and in all the families of American plants, is the prodigious force of vegetation, that, in the latitude of fifty-seven degrees north, on the same isothermal line with Saint Petersburgh and the Orkney Islands, the pinus canadensis displays trunks one hundred and fifty feet high, and six feet in diameter†. Toward night we

* The great white and red cedars of these countries are not the cedrela odorata, but the amyris altissima, which is an icica of Aublet.

† Mr. Langsdorf saw among the inhabitants of Norfolk Sound boats made of one piece, fifty feet long, four feet and a half broad, and three high at the sides. They contain thirty persons. (*Bemerk. auf einer Reise um die Welt*, vol. ii, p. 89). These boats remind us of the canoes of the Rio

arrived at a small farm, in the *puerto* or landing place of Pimichin. We were shown a cross erected near the road, which marked the spot "where a poor capuchin missionary had been killed by wasps." I repeat what we were told by the monks of Javita and the Indians. They talk much in these countries of wasps and venomous ants, but we saw neither one nor the other of these insects. It is well known, that in the torrid zone slight stings often cause fits of fever almost as violent as those, that with us accompany severe organic injuries. The death of this poor monk must have been the effect of fatigue and damp, rather than of the venom contained in the stings of wasps, which the Indians dread extremely. We must not confound the wasps of Javita with the melipones bees, called by the Spaniards *little angels** which covered our faces and hands on the summit of the Silla de Caraccas.

The landing place of Pimichin is surrounded by a small plantation of cacao trees; they are very vigorous, and here, as on the banks of the Atabapo and the Guainia, loaded with flowers and fruits at all seasons. They begin to bear from the fourth year; on the coast of Caraccas

Chagre in the isthmus of Panama, in the midst of the torrid zone. The populus balsamifera attains also an immense height, on the mountains that border Norfolk Sound.

* *Angelitos.* See vol. iii, p. 513.

they do not bear till the sixth or eighth year. The soil of these countries is sandy, wherever it is not marshy; but the light lands of the Tuamini and Pimichin are extremely productive*. When we reflect, that the cacao tree is a native of these forests of the Parima south of six degrees of north latitude, and that the humid climate of the Upper Oroonoko far better suits this valuable tree, than the air of the provinces of Caraccas and Barcelona, which becomes every year dryer, we saw with regret this fine part of the globe in the hands of monks, who encourage no kind of cultivation. The mission of the Observantins alone could furnish annually for expor-

* At Javita, an extent of fifty feet square, planted with jatropha manihot (*yucca*) yields in two years, in the worst soil, a harvest of six *tortas* of cassava; the same extent on a middling soil yields in fourteen months a produce of nine *tortas*. In an excellent soil, around clumps of mauritia (in the *palmares morichales*), there is every year from fifty feet square a produce of thirteen or fourteen *tortas*. A *torta* weighs three quarters of a pound, and three *tortas* cost generally in the province of Caraccas one rial of plate, or one eighth of a piastre. These statements appear to me to be of some importance, when we wish to compare the nutritive matter, which man can obtain from the same extent of soil, by covering it, in different climates, with bread-trees, plantains, jatropha, maize, potatoes, rice, and corn. The slowness of the harvest of jatropha has, I believe, a beneficial influence on the manners of the natives, by fixing them to the soil, and compelling them to sojourn longer on the same spot.

tation fifty thousand *fanegas** of cacao, the value of which in Europe would amount to more than six millions of francs. Around the *connucoes* of Pimichin grows in it's wild state the *igua*, a tree that resembles the caryocar nuciferum, which is cultivated in Dutch and French Guyana, and which, with the *almendron* of Mariquita (caryocar amygdaliferum), the *juvia* of the Esmeralda (bertholletia excelsa), and the geoffrœa of the Amazon, yields almonds the most in request of South America. No commercial advantage is here made of the *igua;* but I saw vessels arrive on the coasts of Terra Firma, that came from Demerary laden with the fruit of the caryocar tomentosum, which is the pekea tuberculosa of Aublet. These trees reach a hundred feet in height, and display by the beauty of their corolla, and the multitude of their stamens, a magnificent appearance. I should tire the reader by continuing the enumeration of the vegetable wonders, which these vast forests contain. Their variety depends on the coëxistence of such a great number of families in a small space of ground, on the stimulating power of light and heat, and on the perfect elaboration of the juices, that circulate in these gigantic plants.

* A fanega weighs one hundred and ten Spanish pounds. We estimate the hundred at one hundred and twenty francs. See vol. iv, p. 238.

We pssed the night in a hut lately abandoned. An Indian family had there left their fishing instruments, pottery, nets made of the petiolæ of palm-trees, all that composes the household furniture of that careless race of men, little attached to property. A great store of *mani* (a mixture of the resin of the moronobea and the amyris caranna) was accumulated round the house. This is used by the Indians here, as at Cayenne, to pitch their canoes, and fix the boney spines of the ray at the point of their arrows. We found in the same place jars filled with a vegetable milk, which serves as a varnish, and is celebrated in the missions by the name of *leche para pintar**. They coat with this viscous juice those articles of furniture, to which they wish to give a fine white colour. It thickens by the contact of the air, without growing yellow, and appears singularly glossy. We have already mentioned†, that the caoutchouc is the oily part, the butter of all vegetable milk. It is no doubt a particular modification of caoutchouc, that forms this *coagulum*, this white and glossy skin, that seems as if covered with a copal varnish. If different colours could one

* The Echinavis say, no doubt by corruption, milk of *pendare*. They call the unknown tree, that yields this milk, *javicou*. This tree, which grows on the banks of the Rio Negro, we could not find.

† Vol. iv, p. 226.

day be given to this milky varnish, a very expeditious method, I think, would be found of painting and varnishing our carriages at once. The more we study vegetable chemistry in the torrid zone, the more we shall discover in some remote spot, but attainable by the trade of Europe, and half-prepared in the organs of plants, products that we believe belong only to the animal kingdom, or which we obtain by processes of art, which, though sure, are often tedious and difficult. Already we have found the wax that coats the palm-tree of the Andes of Quindiu, the silk of the palm-tree of Mocoa, the nourishing milk of the *palo de vaca,* the butter-tree of Africa, and the caseous substance obtained from the almost animalized sap of the carica papaya These discoveries will be multiplied, when, as the political state of the world seems now to indicate, European civilization shall flow in great measure toward the equinoxial regions of the New Continent.

I mentioned above, that the marshy place between Javita and the *embarcadera* of Pimichin is celebrated in the country for the quantity of vipers it breeds. Before we took possession of the deserted hut, the Indians killed two great *mapanarc* serpents*. These grow to

* This name is given in the Spanish colonies to very different species. The coluber mapanare of the province of Caraccas has one hundred and forty-two ventral plates, and

four or five feet long. They appeared to me to be the same species, as those I described in the Rio Magdalena. It is a beautiful animal, but extremely venomous, white below the belly, and spotted with brown and red on the back. As the inside of the hut was filled with grass, and as we lay upon the ground, there being no means of suspending our hammocks, we were not without inquietude during the night. In the morning a large viper was found on lifting up from the ground the jaguar skin, upon which one of our domestics had slept. The Indians say, that these reptiles, slow in their movements when they are not pursued, creep near a man because they are fond of heat. In fact, on the banks of the Magdalena a serpent entered the bed of one of our fellow-travellers, where he remained a part of the night, without doing him any harm. Without wishing here to take up the defence of vipers and rattlesnakes, I believe it may be affirmed, that, if these venomous animals had such a disposition for offence as is supposed, the human species would certainly not have resisted their numbers in some parts of America; for instance on the

thirty-eight candal scales (double). The coluber mapanare of the Rio Magdalena has two hundred and eight ventral plates, and sixty-four double candal scales. See the second vol. of my *Observations de Zoologie*.

banks of the Oroonoko, and the humid mountains of Choco.

May the 6th. We embarked at sunrise, after having carefully examined the bottom of our canoe. It had become thinner, but had received no crack in the *portage*. We reckoned, that the same boat would still bear the voyage of three hundred leagues, which remained for us to make, in going down the Rio Negro, ascending the Cassiquiare, and redescending the Oroonoko as far as Angostura. The Pimichin, which is called a rivulet (canno), is as broad as the Seine opposite the gallery of the Tuileries; but small trees that love the water, corossols* and achras, narrow the bed so much, that there remains open a channel of only fifteen or twenty toises. Next to the Rio Chagre this river is one of the most celebrated in America for the number of it's windings; eighty-five are reckoned, which greatly lengthen it. They often form a right angle, and occur every two or three leagues. To determine the difference of longitude between the landing place and the point where we were to enter the Rio Negro, I took by the compass the course of the Canno Pimichin, and noted the time during which we followed the same direction. The velocity of the current was only 2·4 feet in a second; but

* Anona.

our canoe made by rowing 4·6 feet. The *embarcadere* of the Pimichin appeared to me to be eleven thousand toises west of it's mouth, and 0° 2′ west of the mission of Javita. This *canno* is navigable during the whole year, and has but one *raudal*, which is somewhat difficult to go up; it's banks are low, but rocky. After having followed for four hours and a half the windings of this narrow channel, we at length entered the Rio Negro *.

The morning was cool and beautiful. We had been confined thirty-six days in a narrow boat, so unstable, that it would have been overset by any person rising imprudently from his seat, without warning the rowers to preserve her trim, by leaning on the opposite side. We had suffered severely from the sting of insects, but we had withstood the insalubrity of the climate; we had passed without accident the great number of falls of water and bars, that impede the navigation of the rivers, and often render it more dangerous than long voy-

* In the map of the Oroonoko, constructed by Surville for Caulin's work, which is the most recent of those that preceded my *itinerary map*, the Pimichin is confounded with the Itinivini or Conorichite, which is an arm of the Cassiquiare. La Cruz, who had worked before Surville on the materials furnished by Solano, knew the Pimichin well. It is an important point for the communications of the missions of the Rio Negro with that part of the coast, where the seat of government is placed.

ages by sea. After all we had endured, I may be permitted, perhaps, to speak of the satisfaction we felt in having reached the tributary streams of the Amazon, having passed the isthmus that separates two great systems of rivers, and in being sure of having fulfilled the most important object of our voyage, the determining astronomically the course of that arm of the Oroonoko, which falls into the Rio Negro, and of which the existence has been alternately proved and denied during half a century. In proportion as we draw near to an object we have long had in view, it's interest seems to augment. The uninhabited banks of the Cassiquiare, covered with forests, without memorials of times past, then occupied my imagination, as do now the banks of the Euphrates, or the Oxus, celebrated in the annals of civilized nations. In that interior part of the New Continent we almost accustomed ourselves to regard men as not being essential to the order of nature. The earth is loaded with plants, and nothing impedes their free development. An immense layer of mould manifests the uninterrupted action of organic powers. The crocodiles and the boas are masters of the river; the jaguar, the pecari, the dante, and the monkeys, traverse the forest without fear, and without danger; there they dwell as in an ancient inheritance. This aspect of animated nature, in which man is nothing,

has something in it strange and sad. To this we reconcile ourselves with difficulty on the ocean, and amid the sands of Africa; though in these scenes, where nothing recalls to mind our fields, our woods, and our streams, we are less astonished at the vast solitude through which we pass. Here, in a fertile country adorned with eternal verdure, we seek in vain the traces of the power of man; we seem to be transported into a world different from that which gave us birth. These impressions are so much the more powerful, in proportion as they are of longer duration. A soldier, who had spent his whole life in the missions of the Upper Oroonoko, slept with us on the bank of the river. He was an intelligent man, who, during a calm and serene night, pressed me with questions on the magnitude of the stars, on the inhabitants of the Moon, on a thousand subjects of which I was as ignorant as himself. Being unable by my answers to satisfy his curiosity, he said to me in a firm tone; "with respect to men, I believe there are no more above, than you would have found, if you had gone by land from Javita to Cassiquiare. I think I see in the stars, as here, a plain covered with grass, and a forest *(mucho monte)* traversed by a river." In citing these words, I paint the impression produced by the monotonous aspect of those solitary regions. May this monotony not be found to extend itself

to the journal of our navigation, and tire the reader accustomed to the description of the scenes and historical memorials of the ancient continent!

NOTES

TO THE

SEVENTH BOOK.

NOTE A.

If in the philosophical study of the structure of languages the analogy of a few roots acquires value only when they can be geographically connected together (*Malte. Brun. Geo. Univ.* vol. 5, p. 211, 227), neither is the want of resemblance in roots any very strong proof against the common origin of nations. In the different dialects of the Totonac language (that of one of the most ancient tribes of Mexico), the Sun and the Moon have names, which custom has rendered entirely different. This difference is found among the Caribbees between the language of men and women; a phenomenon that probably arises from the circumstance, that among prisoners men were oftener put to death than women. These introduced by degrees words of a foreign language into the Caribbee; and, as the girls followed the occupations of the women much more than the boys, a language was formed peculiar to the women. I shall record in this note the names of the Sun and Moon in a great number of American and Asiatic idioms, again reminding the reader of the uncertainty of all judgments founded on the simple comparison of solitary words.

NEW CONTINENT: Eastern *Eskimoes* (Greenlanders). Sun: ajut, kaumat, sakanach.—Moon: anningat, kaumei, tatcok. Western *Eskimoes* (Kadjak). S.: tschingugak, madschak.—M.: igaluk, tangeik. *Chippeways.* S.: kissis.—M.: debicot. *Delaware.* S.: natatane.—M.: keyshocof. *Nootka.* S.: opulszthl.—M.: omulszthl. *Otomi.* S.: hindi.—M.: zana. *Aztec* or Mexican. S.: Tonatiuh.—M.: meztli. *Cora.* S.: taica.—M. maitsaca. *Huasteca.* S.: aquicha.—M.: aytz. *Muysca.* S.: zuhè (sua).—M.: chia. *Yaruroes.* S.: do.—M.: goppe. *Caribbees* and Tamanacs. S.: veïou (hueiou).—M.: nouno (nonum). *Maypures.* S.: kiè. M.: kejapi. *Lule.* S.: inni.—M.: allit. *Vilela.* S.: olo.—M.: copi. *Moxoes.* S.: sachi.—M.: cohe. *Chiquitoes.* S.: suus.—M. copi. *Guarani.* S.: quarasi.—M.: jasi. *Tupi* (Brasilians). S.: coaracy. M.: iacy. *Peruvian* (Qquichua). S.: inti.—M. quilla. *Araucan* (Chili). S.: antu.—M.: cuyen.

ANCIENT CONTINENT: *Mongul.* S.: nara (naran).—M.: sara (saran). *Mantchou.* S.: choun.—M.: bia.—*Tschaghatai.* S.: koun.—M.: ay. *Osséte* (of Caucasus). S.: khourr.—M.: mai. *Tibetan.* S.: niyma.—M.: rdjawa. *Chinese.* S.: Jy.—M.: yue. *Japanese.* S.: fi.—M. tsouki. *Sanscrit.* S.: surya, aryama, mitra, aditya, arka hamsa.—M.: tschandra, tschandrama, soma, masi. *Persian.* S.: chor, chorschid, afitab. (*Zend*, houere. *Palavi*, schemschia, zabzeba, kokma).—M.: mah (*Palavi*, koka). *Semitic nations*: 1.) Canaanites, a) *Phenician*, S.; schemesih.b.) *Hebrew.* S.: schemesch.—M.: yarea. 2.) Arameans, a) or. *Chaldean.* S.: schimscha.—M.: yarha. b.) oc. *Syrian.* S.: schemscho.—M.: yarho. 3.) *Arabic.* S.: schams.—M.: kamar. *Ethiopian.* S.: tzahay.—M.: warha.

The American words are written according to the Spanish orthography. I would not change the orthography of the Nootka word *onulszth*, taken from Cook's voyage, to show how much Mr. Volney's idea of introducing a uniform notation of sounds is worthy of attention, if it be not applied to the learned languages of the east written without vowels. In *onulszth* there are four signs for one single consonant. We

have seen above, that American nations, the languages of which have a very different structure, denote the Sun by the same name; that the Moon is sometimes called *Sun to sleep, Sun of night, light of night;* and that sometimes the two orbs have the same denomination. These examples are drawn from the Guarany, the Omagua, Shawanese, Miami, Maco, and Chippewayan idioms. (*See above, p.* 126, 149). Thus, on the ancient continent, the Sun and Moon are denoted in Arabic by *niryn*, "the luminaries;" thus in Persian, the most common words, *afitab* and *chorschid*, are compounds. By the migration of tribes from Asia to America, and from America to Asia, a certain number of roots have passed from one language into others; and these roots have been transported, like the fragments of a shipwreck, far from the coast into the islands. (*Sun*, in New England, kone; in Tschagatai, koun; in Yakout, kouini. *Star*, in Huastec, ot; in Mongul, oddon; in Aztec, citlal, citl; in Persian, sitareh; *house*, in Aztec, calli; in Wogoul, kuala or kolla. *Water*, in Azteck, atel (itels, a river, in Vilele); in Mogul, Tsheremiss, and Tshouvass, âtl, atelch, etel, or idel. *Stone*, in Caribbee, tebou; in the Lesghian of Caucasus, teb; in Aztec, tepetl; in Turkish, tepe. *Food*, in Quichua, micunnan; in Málay, macannon. *A boat*, in Haytian, canoa; in Ayno, cahani; in Greenlandish, cayac; in Turkish, cayic; in Samoyede, cayouc; in the Germannic tongues, kahn.) But we must distinguish from these foreign elements what belongs fundamentally to the American idioms themselves. Such is the effect of time, and the communications among nations, that the mixture with an heterogeneous language has not only an influence upon roots, but most frequently ends by modifying and denaturalizing grammatical forms. "When a language resists a regular analysis," Mr. William de Humboldt observes judiciously in his Considerations on the Mexican, Cora, Totonac, and Tarahumar, "we may suspect some mixture, some foreign influence; for the faculties of man, which are, as we may say, reflected in the structure of languages, and in their grammatical forms, act constantly in a regular and uniform manner."

BOOK VIII.

CHAPTER XXIII.

The Rio Negro.—Limits of Brazil.—The Cassiquiare.—Bifurcation of the Oroonoko.

The Rio Negro, if compared to the Amazons, the Rio de la Plata, or the Oroonoko, is but a river of the second order. It's possession has been for ages of great political importance to the Spanish government, because it might furnish a rival power, Portugal, with an easy road of introduction into the missions of Guyana, and disturbing the *capitania general* of Caraccas in it's southern limits. Three hundred years have elapsed in vain territorial disputes. According to the difference of the times, and the degree of civilization of the natives, they have sometimes leaned on the authority of the sovereign Pontiff, and sometimes on the support of astronomy;

and the disputants being generally more interested in prolonging than in terminating the struggle, the nautical sciences, and the geography of the New Continent, have alone gained by this interminable litigation*. It may be remembered how great an influence the bulls of the Popes Nicholas V, and Alexander VII, the treaty of Tordesillas, and the necessity of fixing the line of demarcation, have had on the ardor with which the solution of the problem of the longitude, the correction of ephemerides, and the improvement of mathematical instruments, have been sought. When the affairs of Paraguay, and the possession of the colony del Sacramento, became of great importance to the courts of Madrid and Lisbon, commissioners of the boundaries were sent to the Oroonoko, the Amazon, and the Rio Plata.

With these idle persons, who filled the archives with protests and statements, were some well-informed engineers, and some naval officers versed in the methods, that were proper to determine the situation of places far from the coast. The little that was known, up to the end of the last century, of the astronomical geography of the interior of the New Continent, was owing to those estimable and laborious men, the French and Spanish academicians, who measured a me-

* *Ulloa, Dissert. historica y geogr. sobre el Meridiano de Demarcacion, Madrid*, 1749, p. 41. *Salazar de los Progressos de la Navigacion en Espana*, p. 115.

ridian line at Quito, and to officers* who went from Valparaiso to Buenos Ayres to join the expedition of Malaspina. It is pleasing to recall to mind the advantages, which the sciences almost accidentally reaped from those *commissions of boundaries*, which were burdensome to the state, and less frequently dissolved than forgotten even by the very men who had claimed their formation.

Those persons who know the uncertainty of the American maps, and have seen those uncultivated lands between the Jupura and the Rio Negro, the Madeira and the Ucayale, the Rio Branco and the coasts of Cayenne, which up to our own days have been gravely disputed in Europe, can never be sufficiently surprised at the perseverance, with which the property of a few square leagues is litigated. These disputed grounds are generally separated from the cultivated part of the colonies by deserts, the extent of which is unknown. In the celebrated conferences of Puente de Caya† the question was agitated, whether, in fixing the line of demarcation three hundred and seventy Spanish leagues‡ to the west of the Cape Verd islands, the pope meant, that the first meridian

* Don Jose de Espinosa, and don Felipe Bauza.

† From the 4th of Nov. 1681, to the 22d of January, 1682.

‡ Or 22° 14′, reckoned on the equator.

should be reckoned from the centre of the island of St. Nicholas, or (as the court of Portugal asserted), from the western extremity of the little island of Saint Antonio. In the year 1754, the time of the expedition of Ituriaga and Solano, negociations were entered into on the possession of the banks of the Tuamini, then desert, and of a marshy ground which we crossed in one evening going from Javita to Canno Pimichin. The Spanish commissioners very recently would have placed the divisional line at the opening of the Apoporis into the Jupura *, while the Portugueze astronomers carried it back as far as Salto Grande †. The missionaries, and the public in general, take a lively interest in these territorial disputes. In the Spanish as well as in the Portugueze colonies, the government is accused of indolent supineness. Whenever the people have no institutions founded on liberty, public spirit

* More accurately Hyapura, or Caqueta.

† *Mapa del Rio Marannon para accompannar a la relacion sobre las operaciones projectadas en la demarcacion de limites por la quarta partida de division, construida por el Ten. Coronel y Ingen, ordinario Don Francisco Requena, Primer Comisario de la misma division, Governador y Comand. general de la prov. de Maynas*, 1783 (manuscript). From this map, which I copied during my stay at Quito, I gathered some geographical information altogether unknown respecting the countries between the Napo, the Putumayo, the Jupura, and the Rio Negro.

is agitated only when there is any question of extending or narrowing the limits of the country.

The Rio Negro and the Jupuro are two tributary streams of the Amazon, and may be compared in length to the Danube. The upper parts belong to the Spaniards, while the lower are occupied by the Portugueze. The population on these two majestic rivers has accumulated where it draws nearest the centre of the most ancient civilization. The banks of the Upper Jupura or Caqueta have been cultivated by missionaries, who descended from the Cordilleras of Popayan and Neiva. The Christian settlements are very numerous from Mocoa to the mouth of the Caguan; while on the Lower Jupura the Portugueze have scarcely founded a few villages. On the Rio Negro, on the contrary, the Spaniards have not been able to rival their neighbours. How could they find support in a population so distant as that of the province of Caraccas? Steppes and forests nearly desert separate, at a distance of one hundred and sixty leagues, the cultivated part of the coast from the four missions of Marsa, Tomo, Daripe, and San Carlos, which are all that the Spanish monks of Saint Francis could establish along the Rio Negro. Among the Portugueze of Brazil the military system, that of *presides* and *capitanes pobladores*, has prevailed over the government of the missionaries. Grand Para is no doubt far

distant* from the mouth of the Rio Negro: but the facility of navigation on the Amazon, which runs like an immense canal in one direction from west to east, has enabled the Portugueze population to extend itself rapidly along the river. The banks of the Lower Maragnon, from Vistoza as far as Serpa, as well as those of the Rio Negro from Fort da Bara to San Jose da Marabitannas, are embellished by rich cultivation, and by a great number of large villages and towns.

These local considerations are combined with others, that pertain to the moral disposition of the nations. The north-west coast of America furnishes to this day no other stable settlements but Russian and Spanish colonies. Before the inhabitants of the United States in their progressive movement from east to west could reach the shore between the latitude of 41° and 50°, that long separated the Spanish monks and the Siberian hunters†, the latter had established themselves south of the river Columbia. Thus in New California the missionaries of Saint Francis, men estimable for their morals, and their

* One hundred and fifty leagues in a straight line.

† The hunters connected with military posts, and dependant on the Russian Company, the principal proprietors of which live at Irkoutsk. In 1804 the little fortress (*crepost*) at the bay of Jakutal was still six hundred leagues distant from the most northern Mexican possessions.

agricultural activity*, learnt with astonishment, that Greek priests had arrived in their neighbourhood; and that two nations, who inhabit the eastern and western extremities of Europe, were become neighbours on a coast of America opposite to China. In Guyana circumstances were of a very different complexion: the Spaniards found on their frontiers those very Portuguezc, who, by their language, and their municipal institutions, form with them one of the most noble remains of Roman Europe; but whom mistrust, founded on unequal strength, and too great proximity, has converted into an often hostile, and always rival power. When quitting the coasts of Venezuela (where, as at the Havannah, and in the rest of the West India islands, men are daily occupied by the commercial politics of Europe), you proceed toward the south, you feel that you are removing daily with increased rapidity from all that belongs to the mother country. Amid the steppes of the Llanos, in those huts covered with ox-hides and surrounded by wild herds, the subjects of conversation are the cares that the cattle require, the drought of the climate, so unfavourable to pasturage, and the damage occasioned by the bats among the heifers and the colts. Embarked on the Oroonoko, and arrived at the

* See my Political Essay on New Spain, vol, 1, p. 320.

missions of the forests, you perceive that the attention of the inhabitants is fixed on other objects, on the inconstancy of the Indians who desert the villages, on the harvest of turtle's eggs being more or less abundant, and on the inconveniences occasioned by a burning and unhealthy climate. If the sting of the moschettoes suffer the monks to admit any other idea, it is that of venting in whispers their complaints against the president of the missions, and deploring the blindness of those, who would reelect, at the next chapter, the guardian of the convent of Nueva Barcelona. Every thing here has a local interest, and that interest, as the monks say, is confined to the affairs of the community, "to these forests, *estas selvas*, which God has ordained us to inhabit." This circle of ideas, narrow and sad enough, enlarges as you pass from the Upper Oroonoko to the Rio Negro, and approach the frontiers of Brazil. There the demon of European politics seems to occupy every mind. The neighbouring country, which extends beyond the Amazon, is called in the language of the Spanish missions neither Brazil, nor the *Capitania-general* of Grand Para; it is *Portugal*, and the copper coloured Indians, the half-black mulattoes whom I have seen going up from Barcelas to the little Spanish fort of San Carlos, are *Portugueze*. These appellations are found in the mouths of the people as

far as the coast of Cumana; and they are fond of relating to travellers how much, at the time of the expedition of Solano, they struck the imagination of a commander at la Vieja Guayana, a native of the mountains of Bierzo. This old officer complained of having come by sea to the banks of the Oroonoko. "If it be true," said he, "as they affirm here, that this vast province of Spanish Guyana extends as far as Portugal (*à los Portugueses*), why did the court make me embark at Cadiz? I should have liked quite as well to have gone some leagues farther by land." These expressions of ignorant simplicity recall to mind the strange opinion of cardinal Lorenzana. This prelate, otherwise well versed in historical studies, says, in a work printed in our own days at Mexico*, that the possessions of the king of Spain in New California and New Mexico, the northern extremity of which is in the latitude of 37° 48′, "border on Siberia by land."

If two nations adjacent to each other in Europe, the Spanish and the Portugueze, have alike become neighbours in the New Continent, they owe this state of things, not to say this disadvantage, to the spirit of enterprise, the active courage which both displayed at the period of their military glory and political greatness. The Castilian language is now spoken in both

* *Historia de Nueva Espanna y Cartas de Hernan Cortes.*

Americas throughout an extent of more than one thousand nine hundred leagues in length: if, however, we consider South America apart, we there find the Portugueze language spread over a larger space of ground, and spoken by a smaller number of individuals than the Castilian. It would seem, as if the bond, that so closely connects the fine languages of Camoëns and Lope de Vega, had served only to separate nations farther, who had become neighbours against their will. National hatred is not modified solely by a diversity of origin, of manners, and of progress in civilization; whenever it is powerful, it must be considered as the effect of geographical situation, and the conflicting interests thence resulting. Nations detest each other a little less, when they are more distant; and when, their languages being radically different, they do not even attempt to combine together. Travellers who have passed through New California, the *interior provinces* of Mexico, and the northern frontiers of Brazil, have been struck by these shades in the moral dispositions of bordering nations.

When I was in the Spanish Rio Negro, the divergent politics of the courts of Lisbon and Madrid had augmented that system of mistrust, which even in calmer times the commanders of petty neighbouring forts love to encourage. Boats went up from Barcelos as far as the Spanish missions, but the communications were of

little frequency. A commander of sixteen or eighteen soldiers wearied " the garrison" by measures of safety, which were dictated " by the important state of affairs;" if he were attacked, he hoped to " surround the enemy." When we spoke of the indifference, with which no doubt the Portugueze government regarded the four little villages, that the monks of Saint Francis had founded on the Upper Guainia, the inhabitants were hurt by the motives, which we alleged with the view to give them confidence. A people, who have preserved in vigour through the revolutions of ages a national hatred, like occasions of cherishing it. The mind delights in every thing impassioned, in the consciousness of an energetic feeling, in the affections and in rival hatreds, that are founded on antiquated prejudices. Whatever constitutes the individuality of nations flows from the mother country to the most remote colonies; and national antipathies are not effaced, where the influence of the same languages ceases. We know from the interesting narrative of Krusenstern's voyage, that the hatred of two fugitive sailors, one a Frenchman and the other English, was the cause of a long war between the inhabitants of the Marquesas Islands. On the banks of the Amazon and the Rio Negro, the Indians of the neighbouring Portugueze and Spanish villages detest each other. These poor people

speak only the American tongues, they are ignorant of what passes "on the other bank of the Ocean, beyond the great salt pool;" but the gowns of their missionaries are of a different colour, and this displeases them extremely.

I have stopped to paint the effects of national animosities, which sage administrators have endeavoured to calm, but have been unable entirely to set at rest. This rivalry has contributed to the imperfection of the geographical knowledge, which we have hitherto obtained respecting the tributary rivers of the Amazon. When the communications of the natives are impeded, and one nation is established near the mouth, and another in the upper part of the same river, it is difficult for the persons who attempt to construct maps, to acquire precise information. The periodical inundations, and still more the *portages*, by which boats are passed from one stream to another, the sources of which are in the same neighbourhood, have led to erroneous ideas of bifurcations and branchings of rivers that do not exist. The Indians of the Portugueze missions, for instance, enter (as I was informed upon the spot) the Spanish Rio Negro on one side by the Rio Guainia* and the Rio Tomo; and the Upper Oroonoko on the other

* It is thus that the Xie or Uexié (Oueicie, Guaixia?), which flows in near the mission of San Marcellino, is called at San Carlos del Rio Negro.

by the *portages* between the Cababuri, the Passimoni, the Idapa, and the Macava, to gather the aromatic seeds of the puchery laurel behind the Esmeralda. The Indians, I repeat, are excellent geographers; they turn the enemy, notwithstanding the limits traced upon the maps, in spite of the forts and the *estacamentos;* and when the missionaries see them arrive from such distances, and in different seasons, they begin to frame hypotheses of pretended communications of rivers. Each party has an interest in concealing what it knows with certainty; and that propensity for all that is mysterious, which is so common and so powerful among the ignorant, contributes to perpetuate the doubt. It may be observed farther, that the various Indian nations, who frequent this labyrinth of rivers, give them names entirely different; and these names are disguised and lengthened by terminations that signify *water, great water, current.* How often have I been perplexed by the necessity of settling the synonymy of rivers, when I have sent for the most intelligent among the natives, in order to interrogate them by means of an interpreter on the number of tributary streams, on the sources of the rivers, and on the *portages!* Three or four languages being spoken in the same mission, it is difficult to make the witnesses agree. Our maps are loaded with names arbitrarily shortened or disfigured. To

examine how far what they contain is accurate, we must be guided by the geographical situation of the confluent rivers, I might almost say by a certain etymological tact. The Rio Uaupe* or Uapes of the Portugueze maps is the Guapue of the Spanish, and the Ucayari of the natives. The Anava† of the ancient geographers is the Anauahu of Arrowsmith, and the Uanauhau or Guanauhu of the Indians. The desire of not having any void in the maps, in order to give them an appearance of accuracy, has caused rivers to be created, to which names have been applied, that have not been recognized as synonimous. It is only of late, that travellers in America, in Persia, and in India, have felt the importance of being correct in the denomination of places. When we read the voyage of the famous Raleigh, it is difficult indeed to recognize in the lake of Mrecabo the laguna of Maracaybo, and in the marquis Paraco the name of Pizarro, the destroyer of the empire of the Incas.

The great tributary streams of the Amazon are designated even by the missionaries of European race by different names in their upper and lower course. The Iza is called higher up Putumayo ; the Jupura toward it's sources bears the name of Caqueta. The researches made in

* A tributary stream of the Rio Negro.

† A tributary stream of the Rio Branco.

the missions of the Andaquies* on the real origin of the Rio Negro have been so much the more fruitless, because the Indian name of the river was unknown. I heard it called Guainia at Javita, Maroa, and San Carlos. The learned historian of Brazil, Mr. Southey, whom I have found very accurate on all the points where I could compare his geographical statements with those which I collected in my travels, says expressly, that the Rio Negro, in the lower part of it's course, is called Guiari, or Curana, by the natives; in the upper part, *Ueneya*†. It is the word Gueneya, instead of Guainia; for the Indians of those countries say indifferently Guaranacua or Ouaranacua‡, Guarapo or Uarapo. Of this last Hondius§, and all the ancient geographers, have made, by a mistake pleasant enough, their *Europa fluvius*.

This is the place in which to speak of the sources of the Rio Negro, which have so long been an object of contention among geographers. The interest we feel in this question is not that alone, which is attached to the origin of all great rivers, but is connected with a crowd of other

* At the eastern declivity of the Andes of Pasto and of Sebondoy.

† *Southey's* History of Brazil, vol. i, p. 598.

‡ A river that falls into the Rio Negro opposite Carvoeyro.

§ In his map for Raleigh's voyage. The Guarapo flows into the Lower Oroonoko, below Guayana Vieja.

questions, that comprehend the pretended bifurcations of the Caqueta, the communications between the Rio Negro and the Oroonoko, and the *local* fable of Dorado, heretofore called Enim, or the empire of the Grand Paytiti. When we study with care the ancient maps of these countries, and the history of their geographical errors, we see how by degrees the fable of Dorado has been transported toward the west with the sources of the Oroonoko. Born on the eastern declivity of the Andes, it was fixed at first, as I shall show in another place, to the south-west of the Rio Negro. The valiant Philip de Urre sought for the great city of Manoa by traversing the Guaviare. Even now the Indians of San Jose de Maravitanos relate, that "on sailing to the north-east for fifteen days on the Guape, or Uaupe, you reach a famous *Laguna de oro*, surrounded by mountains, and so large, that the opposite shore can not be discerned*. A ferocious nation, the Guanes, do not permit the collecting of the gold of a sandy plain, that surrounds the lake. Father Acunna places the lake Manoa, or Yenefiti, between the Jupura and the Rio Negro. Some Manao Indians, (this is the word Manoa, transposing the vowels, which is done by so

* Journals of the Travels of Don Pedro Apollinario Diaz de la Fuente (manuscript).

many American nations) brought Father Fritz, in 1687, several slips of beaten gold. This nation, the name of which is still known * on the banks of the Urarira, between Lamalonga and Moreira †, dwelt on the Jurubesh (Yurubech, Yurubets). M. de la Condamine is right in saying, that this Mesopotamia between the Caqueta, the Rio Negro, the Jurubesh, and the Iquiare, was the first theatre of el Dorado. But where shall we find these names of Jurubesh and Iquiare, given by the Fathers Acunna and Fritz? I think I recognized them in the rivers Urubaxi and Iguari ‡ on some manuscript Portugueze maps which I possess, and which were drawn at the hydrographic repository of Rio Janeiro. During a great number of years I have assiduously studied the geography of South America, north of the Amazon, from the most ancient maps and a collection of many unpublished materials. Desirous that my work should preserve the character of a scientific performance, I ought not to hesitate about treating of subjects,

* See the *Corografia brasiliensis*, which has just appeared at Rio Janeiro, vol. ii, p. 353.

† The Guape and the Urarira fall into the Rio Negro.

‡ It may be written Urubaji. The *j* and the *x* have become the German *ch* to Father Fritz. The Urubaxi, or Hyurubaxi (Yurubech), falls into the Rio Negro near Santa Isabella; the Iguari (Iquiare?) runs into the Issana, which is also a tributary stream of the Rio Negro

on which I may flatter myself that I can throw some light; I mean the sources of the Rio Negro and the Oronooko, the communication between these rivers and the Amazon, and the problem of the auriferous soil, which has cost the inhabitants of the New World so many tears, and so much blood. I shall touch on these questions, according as my journals lead me toward the places, where they are most agitated by the inhabitants themselves. As it would be necessary, however, to enter into minute details, if I attempted to give all the proofs of my assertions, I shall here confine myself to the mention of the most striking results, and shall reserve the more ample discussion for the *Analysis of the maps*, and the *Essay on the Astronomical Geography of the New Continent*, which will be published at the head of the Geographical Atlas.

These researches lead to the general conclusion, that, in the distribution of the waters circulating on the surface of the Globe, as well as in the structure of organic bodies, nature has pursued a much less complicated plan, than has been believed by those, who have suffered themselves to be guided by vague conceptions and a taste for the marvellous. We find too, that all the anomalies, all the exceptions to the laws of hydrography, which the interior of America displays, are merely apparent; that the course of

running waters furnishes phenomena equally extraordinary in the ancient world, but that these phenomena from their littleness have less struck the imagination of travellers. When immense rivers may be considered as composed of several parallel furrows* of unequal depth; when these rivers are not enclosed in valleys; and when the interior of a great continent is as flat as the shores of the sea with us; the ramifications, the bifurcations, and the interlacings in the form of net work, must be infinitely multiplied. From what we know of the equilibrium of the seas, I cannot think, that the New World issued from the waters later than the Old; and that organic life is there younger, or more recent: but, without admitting oppositions between the two hemispheres of the same planet, we may conceive, that in the hemisphere most abundant in waters the different systems of rivers required more time, to separate themselves from one another, and establish their complete independance. The deposites of mud, which are formed wherever the running waters lose somewhat of their swiftness, contribute no doubt to raise the beds of the great confluent

* *See* my memoir on the causes of the bifurcations of rivers, in the *Journal of the Royal Polytechnic School*, vol. iv, p. 65.

streams, and augment their inundations; but at length these deposites obstruct entirely the branches of the rivers, and the narrow channels, that connect the neighbouring streams. The substances washed down by rainwaters form by their accumulation new bars, *isthmuses of deposited earth,* and points of division, which did not before exist. It hence results, that these natural channels of communication are by degrees divided into two tributary streams, and from the effect of a transverse rising acquire two opposite slopes. A part of their waters is turned back toward the principal recipient, and a buttress rises between the two parallel basins, which occasions all traces of their ancient communication to disappear. From this period the bifurcations no longer connect different systems of rivers; and, where they continue to take place at the time of great inundations, we see that the waters diverge from the principal recipient only to enter it again after a longer or shorter circuit. The limits, which at first appeared vague and uncertain, begin to be fixed; and in the lapse of ages, from the action of whatever is moveable on the surface of the Globe, from that of the waters, the deposites, and the sands, the basins of the rivers separate, as the great lakes are subdivided*,

* For instance, the lakes of the valley of Mexico since the sixteenth century.

and as the inland seas lose their ancient communications*.

The certainty acquired by geographers since the 16th century of the existence of several bifurcations, and the mutual dependance, of various systems of rivers in South America, have led them to admit an intimate connection between the five great tributary streams of the Oroonoko and the Amazon; the Guaviare, the Inirida, the Rio Negro, the Caqueta or Hyapura†, and the Putumayo or Iza. These hypotheses, which our maps exhibit under different forms, took rise partly in the missions of the plains, and partly on the back of the Cordilleras of the Andes. In travelling from Santa-Fe de Bogota, by Fusagasuga to Popayan and Pasto, you are told by the mountaineers, that the *Paramos* de la Summa Paz (of eternal Peace), of Is-

* The geological constitution of the soil seems to indicate, that, notwithstanding the actual difference of level in their waters, the Black Sea, the Caspian, and lake Aral, communicated with each other in an era anterior to historic times. The overflowing of the Aral into the Caspian Sea seems even to be partly of a more recent date, and independant of the bifurcation of the Gihon (*Oxus*), on which one of the most learned geographers of our days, Mr. Ritter, has thrown new light. *Erdkunde,* vol. 1, p. 665 and 695.

† Hyapura or Jupura. Thus, instead of Javary, Yutai, and Yurua, (tributary streams of the Amazon), the people of the country say Hyabary, Hyutahy, and Hyuruha (*Corogr. bras.*, vol. ii, p. 285).

cance, and of Aponte, gave birth on their eastern declivity to all the rivers, that traverse the forests of Guyana between the Meta and the Putumayo. The tributary streams being taken for the main trunks, and the course of all these rivers being prolonged as far as the chain of the mountains, the sources of the Oroonoko, the Rio Negro, and the Guaviare, are confounded together. The extreme difficulty of descending the rapid declivity of the Andes toward the east, the shackles with which a narrow policy fetters the commerce with the *Llanos* of the Meta, San Juan, and Caguan, and the little interest that is felt in following and exploring the branches of these rivers, have all served to augment this geographical uncertainty. When I was at Santa Fe de Bogota, the road that leads by the villages of Usme, Ubaque, or Caqueza, to Apiay and the embarcadera of the Rio Meta, was scarcely known. It was but recently I could rectify the map of this river by the journals of the canon Cortes Madariaga, and the notions acquired during the war of independance in Venezuela.

The following is all that we know with certainty on the situation of the sources at the foot of the Cordilleras, between 4° 20′ and 1° 10′ of north latitude. Behind the Paramo of Suma Paz, of which I took the bearings from Pandi, rises the Rio de Aguas Blancas, which, with the

Pachaquiaro, or Rio Negro of Apiay, forms the *Meta;* more to the south lies the Rio Ariari, which is one of the tributary streams of the *Guaviare,* the mouth of which I saw near San Fernando de Atabapo. In following the back of the Cordillera toward the Ceja and the Paramo de Aponte, we find the Rio Guayavero, which passes near the village of Aramo, and joins the Aviari*. Below this confluence, the two rivers take the name of Guaviare. South-west of the Paramo de Aponte, at the foot of the mountains, near Santa Rosa, rises the Rio Caqueta; and on the Cordillera itself the Rio de Mocoa, celebrated in the history of the conquest. These

* The passage of these two rivers, the Ariari and Guayavero (Guayare or Canicamare), is clearly distinguishable in the account of the expedition of Jorge de Espira (Georg von Speier) from Coro to the province of Choques, in 1536. But what is that great river Papamene (Rio de Plata), which this *conquistador* passed after the Guayavero, and which *comiença à las espaldos,* that is, to the south-east of the villa de Timana? Beyond a doubt it is the Caqueta, or the Rio Fragua, which flows into the Caqueta. (*Fray Pedro Simon, Notici. de la Conquista,* p. 188—201, and 332). Mr. Southey well observes, that an ample folio volume might be filled with the accounts of the expeditions, that have been made to discover el Dorado. A compilation of this kind would furnish not merely a sad picture of human sufferings, cruelties, and follies, but might also serve to throw some light on the geography of the interior of South America, if, (which has not been hitherto attempted) the roads pursued by these expeditions were discussed.

two rivers, which are united a little above the mission of San Augustin de Nieto, form the *Jupurá*, or *Caqueta*. The sources of the Rio de Mocoa are separated by the Cerro del Portachuelo, a mountain that rises on the table-land itself of the Cordilleras, from the lake (*Sienega*) of Sebondoy, which is the origin of the Rio *Putumayo* or Iza. The Meta, the Guaviare, the Caqueta, and the Putumayo, are consequently the only great rivers, that rise immediately from the eastern declivity of the Andes of Santa Fe, Popayan, and Pasto. The Vichada, the Zama, the Inirida, the Rio Negro, the Uaupe, and the Apoporis, which are marked in our maps as reaching to the west as far as the mountains, take rise at a great distance from them, either in the savannahs between the Meta and the Guaviare, or in the mountainous country, which, according to the information given me by the natives, begins at four or five days' journey distant, to the west of the missions of Javita and Maroa, and extends, through the Sierra Tunuhy, beyond the Xie, toward the banks of the Issana.

It is remarkable, that this ridge of the Cordilleras, which contains the sources of so many majestic rivers, (the Meta, the Guaviare, the Caqueta, and the Putumayo,) is as little covered with snow, as the mountains of Abyssinia from which flows the blue Nile; but, on the contrary,

on going up the tributary streams which furrow the plains, a volcano is found still in activity, before you reach the Cordillera of the Andes. This phenomenon was discovered recently by the monks of St. Francis, who go down from Ceja by the Rio Fragua to Caqueta. A solitary hill, emitting smoke night and day, is found on the north-east of the mission of Santa Rosa, and west of the Puerto del Pescado. This is the effect of a lateral action of the volcanoes of Popayan and Pasto; as the Guacamayo and the Sangay, situate also at the foot of the eastern declivity of the Andes, are the effect of a lateral action produced by the system of the volcanoes of Quito. After having closely inspected the banks of the Oroonoko and the Rio Negro, where the granitic rock every where pierces the soil; when we reflect on that total absence of volcanoes in Brazil, Guyana, on the coast of Venezuela, and perhaps in all that part of the continent, which lies to the east of the Andes; we contemplate with interest the three burning volcanoes, that are situate near the sources of the Caqueta, the Napo, and the Rio de Macas, or Morona.

Although the imposing greatness of the Rio Negro had already struck Orellana, who saw it in 1593 at it's confluence with the Amazon *undas nigras spargens*, it was not however till a century later, that geographers sought for it's

origin on the declivity of the Cordilleras. The voyage of Acunna gave rise to hypotheses, which have been propagated down to our own days, and which Messrs. de la Condamine and d'Anville have multiplied beyond measure. Acunna had been told, in 1638, at the mouth of the Rio Negro, that one of it's branches communicated with another great river, on which the Dutch were settled. Mr. Southey* judiciously observes, that this notion, received at an immense distance from the coast, proves the frequency and activity of the intercourse at that period between the barbarous nations of those countries (particularly among those of the Caribbean race). It remains doubtful, whether the Indians whom Acunna interrogated meant to acquaint him with the communication between the Oroonoko and the Rio Negro by means of the Cassiquiare, a natural channel, which I went up from San Carlos to Esmeralda; or only to give him a vague idea of the *portages* between the sources of the Rio Branco† and the Rio Essequibo. Acunna himself was not of opinion, that the great river, the mouth of which was in possession of the Dutch, was the

* History of Brazil, vol. i, p. 599.

† It is the Rio Parime, Rio Blanco, Rio de Aguas Blancas of our maps, that flows into the Rio Negro below Barcellos, and is called by the inhabitants of it's banks, *Quecuene*.

Oroonoko; he imagined, that there was a communication with Rio San Felipe, which flows out west of Cape North, and by which, according to him, the tyrant Lopez de Aguirre terminated his long navigation. This last hypothesis appears to me very conjectural, although, as we have seen above, the tyrant, in his strange letter to Phillip II, confesses himself, that, "he knows not how he and his men got through so great a mass of water.*"

Until Acunna had acquired in his voyage some vague notions of the communications with another great river north of the Amazon, the best informed missionaries considered the Oroonoko as a continuation of the Caqueta (Kaqueta, Caketa). "This river," says Fray Pedro Simon† in 1625, "rises on the eastern declivity

* See vol. iv, p. 259, and vol. ii, p. 220. In reading again carefully the narrative of the voyage of Lopez de Aguirre, of which Fray Pedro Simon has preserved a minute account (Notic. 6, c. 23—25, p. 471-482), I see nothing to indicate, that the expedition ever went out of the bed of the Amazon. We see the river enlarging itself by degrees, and that Aguirre went out (in the beginning of the month of July 1561) through an opening full of very low and small islands, which was eighty leagues broad. The facility, with which his sloops performed in seventeen days the passage of the "*golfo que ay desde la boca del Rio hasta la isla de la Margarita*," might appear surprising, if we did not recollect the force of the currents, which in these latitudes run to the north-west.

† We must here recollect, that Fray Pedro Simon, Pro-

of the Paramo d' Iscance. It receives the Papamene, which comes from the Andes of Nueva, and takes successively the names of Rio Iscance, Tama (on account of the adjacent province of Tama Indians), Guayave, Baraguan, and Oroonoko." The position of the Paramo of Iscance, a lofty pyramidal summit, which I saw from the table-land of Mamendoy and the beautiful banks of the Mayo, characterises in this description the Caqueta. The Rio Papamene is the Rio de la Fragua, which forms with the Rio de Mocoa one of the principal branches of the Caqueta; and is known to us by the chivalrous travels of George of Spires and Philip von Huten*. These two warriors did not reach the banks of the Papamene, till they had passed the Ariari and Guayavero. The Tama Indians† are

vincial of the Order of Saint Francis in New Grenada, examined with his own eyes a great part of South-America, and wrote his history in part from the important memoirs of the great *Conquistador* and Adelantado Gonzalo Ximenes di Quesada, who described his own expeditions in two volumes, with the title of *Ratos de Suesca*, as well as from the journals of the Fathers Francisco Medrano, Pedro Aguado, and Juan de Castellanos.

* It is difficult to recognize the illustrious name of Huten in the Spanish historians. They call Philip von Huten, by retrenching the aspirate *h*, Felipe de Uten, de Urre, or de Utre. "*Uten como algumos quieren que se llamase Utre.*" (Simon, p. 351.)

† They, as well as the Coreguajes, speak the Cora language.

still one of the nations that spread widest along the northern bank of the Caqueta; it is not surprising therefore, that this river received, according to Fray Pedro Simon, the name of Rio Tama. The sources of the tributary streams of the Caqueta lying very near those of the Guaviare, one of the largest tributary rivers of the Oroonoko, led to the error entertained from the beginning of the seventeeth century, that the Caqueta (Rio de Iscance and Papamene), the Guaviare (Guayare), and the Oroonoko, were the same river. No person had descended the Caqueta toward the Amazon, and recognized, that the river called lower down Jupura, is identically the same with the Caqueta. A tradition preserved in our days among the inhabitants of those countries, according to which a branch of the Caqueta, below the confluence of the Caguan and Payoya, flows into the Inirida and the Rio Negro, has no doubt contributed to the opinion, that the Oroonoko rises on the back of the mountains of Pasto.

We have just seen, that it was supposed in New Grenada, that the waters of the Caqueta, like those of the Ariari, the Meta, and the Apure, flowed toward the great basin of the Oroonoko. If the direction of these tributary streams had been observed with more attention, it would have been perceived, that, notwithstanding the general slope of the ground to-

ward the east, there are in the terrestrial polyedrons, of which the plains are composed, slopes of a second order, inclining to the north-east and to the south-east. An almost imperceptible ridge or *line of summits* stretches itself, in the latitude of two degrees, from the Andes of Timana toward the isthmus, that separates Javita from *Canno* Pimichin, and by which we had caused our canoe to be carried. North of this parallel of Timana, the course of the waters* is directed to the north-east, or east; and forms the tributary streams of the Oroonoko, or the tributaries of these streams. But south of the parallel of Timana, in plains which appear to resemble perfectly those of San Juan, the Caqueta or Jupura, the Putumayo or Iza, the Napo, the Pastaza, and the Morona, run to the south-east and south-south-east, into the basin of the Amazon. It is even very remarkable, that this *ridge of separation* is itself but a prolongation of that, which I found in the Cordilleras on the road from Popayan to Pasto. In drawing a *line of summits* through Ceja (a little south of Timana) and the Paramo de las Papas toward l'Alto del Roble, between 1° 45′ and 2° 20′ of latitude, at nine hundred and seventy toises of elevation, we find the *divortia aquarum*

* The Inirida, the Guaviare, the Vichada, the Zama, the Meta, the Casanare, the Apure.

between the Caribbean sea and the Pacific Ocean*.

Before the voyage of Acunna an idea was spread among the missionaries, that the Caqueta, the Guaviare, and the Oroonoko, were but different names for the same river; but Sanson the geographer, in the maps which he framed on the observations of Acunna, conceived the idea of dividing the Caqueta into two branches, one of which should be the Oroonoko, and the other the Rio Negro, or Curiguacuru. This bifurcation at right angles is figured on all the maps of Sanson, Coronelli, Du Val, and De l'Isle†, from 1656 to 1703. It was presumed that in this manner the communications of the great rivers might be explained, of which Acunna had brought the first tidings from the mouth of the Rio Negro; and it was never suspected, that the Jupura was the real continuation of the Caqueta. Sometimes the name of the Caqueta was made to disappear entirely, and the river that formed the bifurcation was termed the Rio Paria or Yuyapari, which are the ancient denominations of the Oroonoko. De l'Isle, toward the

* *See* my map of the Rio de la Magdalena, and my *Obs. Astron.*, vol. i, p. 304. (*Nivellement geologique*, No. 130.)

† *See* three maps of South America, by Sanson, in 1656, 1669, and 1680; map of Du Val in 1684; map of Coronelli, in 1689; maps of De l'Isle, in 1700 and 1703.

close of his days, suppressed* the bifurcation of the Caqueta, to the great regret of la Condamine†; made the Putumayo, the Jupura, and the Rio Negro, entirely independant rivers; and, as if to banish all hope of communication between the Oroonoko and the Rio Negro, figured a lofty chain of mountains between the two rivers. Father Fritz‡ had before followed the same system, which was believed to be the most probable in the time of Hondius.

The voyage of M. de la Condamine, which has thrown so much light on different parts of America, has embroiled all that is connected with the courses of the Caqueta, the Oroonoko, and the Rio Negro. This illustrious traveller has well observed, it is true, that the Caqueta (of Mocoa) was the river, which, in the Amazon, bears the name of Jupura; but he not only adopted the hypothesis of Sanson, he even tripled the number of bifurcations of the Caqueta. By the first, a branch (the Jaoya) of the Caqueta flows into the Putumayo; a second forms the Jupura and the Rio Paragua; and by a third the Rio Paragua is subdivided into two rivers,

* Already in his map of 1722.

† *Mém. de l' Acad.*, 1745, p. 438.

‡ *See* a manuscript map (*Tabula geografica del Rio Marannon*) of 1690, which I found among a collection of d'Anville's maps, preserved at Paris in the archives of the ministry of foreign affairs, No. 9545.

the Oroonoko and the Rio Negro. This imaginary system is represented in the first edition* of the fine map of America by d'Anville. It thence results, that the Rio Negro separates itself from the Oroonoko below the Great Cataracts; and that, in order to reach the mouth of the Guaviare, you must go up the Caqueta beyond the bifurcation, which gives birth to the Rio Jupura. When M. de la Condamine learned, that the Oroonoko, far from having it's source at the foot of the Andes de Pasto, came from the back of the mountains of Cayenne, he modified his ideas in a very ingenious manner. The Rio Negro no longer issued from the Oroonoko; the Guaviare, the Atabapo, the Cassiquiare, and the mouth of the Inirida (under the name of the Iniricha, take nearly their true situations on the second map of d'Anville; but the third bifurcation of the Caqueta gives rise to the Inirida and the Rio Negro. This system was maintained by Father Caulin, marked upon the map of La Cruz, and copied on all those, that appeared up to the commencement of the 19th century. The names of the Caqueta, the Oroonoko, and the Inirida, it is true, do not excite that interest, and those historical remembrances, that belong to the rivers of the interiour of Ni-

* *See* above, p. 11. (*Cartas de la Bibliothèque du Roi*, No. 745.)

gritia ; but the varions combinations of the geographers of the New Continent recal to mind the strange manner, in which the courses of the Niger, the White Nile, the Gambaro, the Jolliba, and the Zaire, have been traced. From year to year, the domain of hypotheses is lessened ; problems are better defined ; and that ancient part of geography, which might be called speculative, not to say conjectural, is circumscribed within narrower limits.

It is not therefore on the banks of the Caqueta, but on those of the Guainia or Rio Negro, that any positive notion can be acquired respecting the sources of the last-mentioned river. The Indians who inhabit the missions of Maroa, Tomo, and San Carlos, have no knowledge of an upper communication* between the Guainia and the Jupura. I measured it's breadth opposite the little fort of Saint Augustin, and found it was† 292 toises ; it's mean breadth, near

* Father Caulin makes the strange conjecture, that the upper part of the Rio Negro has received the name of *Caquèta* from the Spanish Americans, because it has been confounded with another Rio Negro (Rio de *Caquesa*), that rises near the village of Caquesa, east of Santa-Fé de Bogota, and forms the Rio Meta, after having joined the Umadea. (*Hist. corogr.*, p. 82.)

† Basis 212 metres, angles 90° and 69° 36′. The breadth of the river is 570 metres, or 682 varas. This is three times the breadth of the Seine near the Garden of Plants, at Paris.

Maroa, is from 200 to 250 toises. It is estimated by M. de la Condamine, near the mouth in the Amazon, in the narrowest part, at 1200 toises, an increase of 1000 toises on 10° of the length of it's course * in a direct line. Notwithstanding the still considerable volume of water, which we found between Maroa and San Carlos, the Indians assert, that the Guainia rises at five days of navigation west-north-west of the mouth of the Pimichin, in a mountainous country, which gives birth to the sources of the Inirida. As you may go up the Cassiquiare in ten or eleven days from San Carlos to the point of the bifurcation of the Oroonoko, five days' journey may be estimated, as you ascend against a much less rapid current, at a little more than 1° 20′ of direct distance; which would place the sources of the Guainia, according to my observations of the longitude made at Javita and San Carlos, 71° 35′ west of the meridian of Paris. Notwithstanding the perfect accordance which prevailed in the testimony of the natives, I believe, that the sources are still more to the west; the boats being able to go up only as far as the bed of the river permits. We must not pronounce in too positive a manner from the analogy of the rivers of Europe on the proportion between the breadth

* Reckoning the mean degree at 57,008 toises.

and length of the upper course*. The rivers in America often acquire an extraordinary increase† in the volume of their waters, during a course of no considerable length.

What particularly characterises the Guainia in it's upper course is the want of sinuosities; it is like a large canal traced in a direct line through a thick forest. Whenever the river changes it's direction, it presents openings to the eye of equal length. The banks are high, but even, and seldom rocky. The granite, traversed by immense veins of white quartz, appears in general only in the middle of the bed. In going up the Guainia to the north-west, the current augments in rapidity every day of the navigation. The banks of the river are desert; it is only toward the sources (*las cavezeras*), that the hilly country is inhabited by the Manivas and Poignaves. The sources of the Inirida (Iniricha), I was told by the Indians, are but two or

* The Seine and the Marne, for instance, furnish more than 2° of distance (on a calculation of their direct course), from Paris to their sources.

† The length of the course of the Rio Ventuari and the Rio Caura is only 1° 20′ and 1° 50′, I do not mention the immense river Guayaquil, and others that rise on the western declivity of the Andes, because they form (like the Thames and the Severn) vast gulfs at the mouth, a species of lakes, the fresh waters of which, in their oscillating movements, are repelled or stopped by the tides of the Ocean.

three leagues distant from those of the Guainia, where a *portage* might be established. Father Caulin learned at Cabruta, from an Indian chief, named Tapo, that the Inirida approaches very near the Patavita (Paddavida, on the map of La Cruz), which is a tributary stream of the Rio Negro. The natives of the banks of the Upper Guainia know nothing of this name, or of that of a lake (Laguna del Rio Negro), which is ound on the ancient Portugueze maps*. This pretended Rio Patavita is probably nothing more than the Guainia of the Indians of Maroa; since, as long as geographers believed in the bifurcation of the Caqueta†, they made the Rio Negro rise from that branch, and from a river which they called Patavita‡. According to the accounts of the natives, the mountains, at the sources of the Inirida and the Guainia, do hot exceed the height of Baraguan, which I found to be one hundred and twenty toises.

The manuscript Portugueze maps§, construct-

* *See* also the *Amérique Meridionale of M. Brué*, 1816.

† La Condamine in the *Mém. de l'Acad.*, 1745, p. 451; and *see*, at *l'Amazone*, 1745, p. 123. D'Anville in the *Journal des Savans*, March 1750, p. 185.

‡ The confluence of this supposed branch with the Patavita, according to M. Bonne, whose astronomical deductions (where he had good data) are very judicious, is in 1° 30′ of north latitude, and 75° of west longitude. (*Atlas de Raynal*, No. 81.)

§ In studying these maps, which are very instructive,

ed recently at the hydrographic depot of Rio Janeiro, confirm the notions that I acquired on the spot. They mark none of the four communications of the Caqueta or Jupura with the Guainia (Rio Negro), the Inirida, the Uaupes (Guapue), and the Putumayo; they represent each of these tributary streams as an independant river; they suppress the Rio Patavita, and place the sources of the Guainia only 2° 15′ west of the meridian of Javita. The Rio Uaupes, one of the tributary streams of the Guainia, seems to prolong it's course much more to the west than the Guainia itself, and it's direction is such, that, without crossing it, no branch of the Caqueta could reach the Upper Guainia. I shall

with respect to the eastern part of Brazil, we recognize the extreme difficulty, which the Portugueze geographers found in combining their ideas of the Lower Jupura, and the Lower Putumayo, with the Spanish notions of the sources of these rivers. They commit the error, for instance, of naming that part of the Putumayo or Iza, where the Missions of San Antonio de Amaguajes, Socombios, and San Diego, are situate, the Upper Jupura; they make the Rio de Mocoa and the Rio Fragua fall into the Apoporis, which is but a tributary stream of the Caqueta; and they take from the Rio Iza (Issa or Putumayo) two thirds of it's course. I shall observe on this occasion, that the most recent Portugueze maps, like the most ancient maps of D'Anville and de la Cruz, lay down the Chamusigueni, (Chamequisseen of Arrowsmith, Chamochiqueni of my itinerary map of the Oroonoko), as a tributary stream of the Rio Negro, while the Indians report it to be a tributary stream of the Inirida. (*Caulin*, p. 75.)

terminate this discussion by bringing a direct proof against the assertion of those, who would make the Guainia rise, like the Guaviare and the Caqueta, from the eastern declivity of the Cordillera of the Andes. During my abode at Popayan, the guardian of the convent of St. Francis, Fray Francisco Pugnet, an amiable and judicious man, gave me very precise ideas of the missions of the Andaquies, where he had long resided. He had performed a very difficult journey from the banks of the Caqueta to those of the Guaviare. Since Philip Von Huten (Urre) and the earliest times of the conquest, no European had traversed this unknown land. Father Pugnet set out from the mission of Caguan, situate on the Rio Caguan, one of the tributary streams of the Caqueta. He passed over an immense savannah entirely destitute of trees, the eastern parts of which are inhabited by the Tamas and Coreguajes. After six days journeying toward the North, he arrived at a small place called Aramo, on the banks of the Guayavero, about fifteen leagues west of the point, where the Guayavero and the Aiari form the great Rio Guaviare. Aramo is the westernmost village of the missions of San Juan de los Llanos. There Father Pugnet heard of the great cataracts of the Rio Guaviare, those* no doubt,

* See above, p. 216.

which the president of the missions of the Oroonoko visited, in going up the Guaviare from San Fernando de Atabapo); but he crossed no river on his way from Caguan to Aramo. It is therefore fully proved, that in the longitude of seventy-five degrees* at forty leagues distance from the declivity of the Cordilleras, in the midst of the Llanos, there exists neither the Rio Negro (Patavita, Guainia), nor Guapue (Uaupe) nor Inirida, and that these three rivers rise to the east of that meridian. These particulars are extremely valuable; the geography of the interior of Africa is not more embroiled than that of the country between the Atabapo and the sources of the Meta, the Guaviare, and the Caqueta. "It is difficult to believe," says Mr. Caldas in a scientific journal† published at Santa-Fe de Bogota, "that we do not possess one map of the plains, which commence at the eastern declivity of these mountains, which we see daily before our eyes, and on which the chapels of Guadaloupe and Monserrat are erected. No person knows the breadth of the Cordilleras, or the course of the rivers which fall into the Oroonoko and the Amazon; and yet it will be by these tributary

* I have determined this longitude from the observations of the Portugueze astronomers at the Jupuru and the Apoporis, and from the difference of the meridians of Popayan, and of San Juan de los Llanos.

† *Semanario del Nuevo Reino do Granada*, vol. i, p. 44.

streams, by the Meta, the Guaviare, the Rio Negro, and the Caqueta, that the inhabitants of Cundinamarca will communicate, in happier times, with those of Brazil and Paraguay."

I am aware, a persuasion is pretty generally spread in the missions of the Andaquies, that the Caqueta sends off, between the confluents of the Rio de la Fragua and of the Caguan *, a branch to the Putumayo; and farther down, below the mouth of the Rio Payoya, another branch to the Oroonoko: but this opinion rests only on a vague tradition of the Indians, who often confound *portages* † with bifurcations. The cataracts at the mouth of the Payoya, and the ferocity of the Huaques, called also *Murcielagos* (bats), because they suck the blood of their prisoners, prevent the Spanish missionaries from descending the Caqueta. No white man has ever come from San Miguel de Mocoa to the confluence of Caqueta with the Amazon. The Portugueze astronomers, at the time of the last commission of boundaries, first went up the Caqueta, as far as the latitude of 0° 36′ south, and then the Rio de los Enganos (Deceitful River) and the Rio Cunare, which are tributary

* Near the ruined mission of Santa Maria, a little below the Rio Mecaya.

† I know two of these *portages* between tributary streams of the Apoporis (the Cananare and Japui) and others of the Uaupes (the Jucari, the Capuri, and the Tiquie).

streams of the Caqueta, as far as 0° 28′ north latitude*. In this navigation, they saw no branch of the Caqueta issuing toward the north. The Amu, and the Yabilla, of which they carefully examined the sources, are small rivers that fall into the Rio de los Enganos, and with this river, into the Caqueta. If therefore the bifurcation take place, it can be found only in the very short distance that lies between the confluence of the Payoya and the second cataract, above the mouth of Deceitful River; but, I repeat, the course of this river, and of the Cunare, the Apoporis, and the Uaupes, would hinder this pretended branch of the Caqueta from reaching the Upper Guainia. Every thing appears to indicate the existence of a ridge, a rising of counter-slopes between the tributary streams of the Caqueta, and those of the Uaupes and the Rio Negro. Still more: we found, by the height of the mercury in the barometer, the absolute elevation of the ground on the banks of the Pimichin to be one hundred and thirty toises. Supposing, that the hilly ground near the sources of

* These positions, founded on direct observations, are taken from the great manuscript map of Mr. Requena, one of the commissioners of the boundaries. Is it of the Rio Payoya M. de la Condamine has made his Rio Jaoya, which, according to him, unites the Caqueta to the Putumayo? The missionaries of the Upper Caqueta do not know this name of Jaoya.

the Guainia is fifty toises more elevated than that of Javita, it follows, that the bed of the river, in the upper part of it's course, is at least two hundred toises above the level of the ocean, a height equally little with that, which the barometer indicates for the banks of the Amazon near Tomependa, in the province of Jaen de Bracamoros. Now, if we reflect on the steep descent of this immense river from Tomependa as far as the meridian of 75°, and if we recollect the distance from the missions of the Rio Caguan to the Cordillera, we cannot doubt, that the bed of the Caqueta, below the mouths of the Caguan and the Payoya, must be much lower than the bed of the Upper Guainia, toward which it would have to send a part of it's waters. Besides, the waters of the Caqueta are quite white, while those of the Guainia are black or coffee-coloured. There is no example of a white river becoming black in it's course. The Upper Guainia, therefore, cannot be a branch of the Caqueta. I doubt even if we can justify the supposition, that the Guainia, as principal and independant recipient, obtains the smallest quantity of water toward the south by a lateral branch *.

* Two letters of the guardian Fray Jose Joacquini Barrutieta (of the 15th of November 1761, and the 23d of July 1763,) in the archives of the convent of Saint Francis, were communicated to me at Popayan; in which this monk, an enthusiast for the greatness and importance of the Caque

The little group of mountains, with which we became acquainted at the sources of the

says, that this river sends a branch to the north, which branch in it's bifurcation gives birth to the Oroonoko and the Rio Negro. He calls the branch of the Oroonoko Paragua, that of the Rio Negro Casiri. He seems to hint, that the Casiri is not the only source of the Rio Negro, and that this great river perhaps receives only the waters of the Caqueta by the Casiri. Barrutieta had seen neither the branch of the Caqueta which goes to the north, nor the bifurcation of this branch. He had never been below the mouth of the Caqueta; and the priests, who have since inhabited these missions, believe, that father Barrutieta could have derived these ideas only from maps constructed in Europe. Never has any tributary stream of the Oroonoko, coming from the west, borne the name of Paragua (see above, p. 219); and the hypothesis, that the Caqueta by a bifurcation gives birth to the Oroonoko and the Rio Negro, dates already, as we have seen, from the time of the geographer Sanson, in the year 1656. We know with certainty, by the voyage which I made with M. Bonpland, and by that of father Mancilla, that neither the Oroonoko, nor the Guaviare, which has been asserted to be the real trunk of the Oroonoko, receives a branch of the Caqueta. If the missionaries of the Andaquies (that is to say, the monks of the Rio Mocoa, the Caqueta, the Rio de la Fragua, and the Rio Caguan) believe in a southern branch of the Caqueta, which, below the mouth of the Macaya or Picudo, flows toward the Putumayo, the missionaries of the Putumayo on the contrary deny it's existence. They assured me, that they had never heard of any branch of the Caqueta in going up from the *lower missions* of the Putumayo, (Marive, the Assumption, San Ramon,) or from the mouth of the Rio Yaguas to the *upper missions* (Mamos, San Diego, San Rafael de Amaguajes), or at the mouth of the Rio del Guiuco.

Guainia, is so much the more remarkable from it's being isolated in the plain that extends to the south-west of the Oroonoko. It's situation with regard to longitude might lead to the belief, that it stretches into a ridge, which forms first the strait (*Angostura*) of the Guaviare*, and then the great cataracts (*saltos, cachoeiras*) of the Uaupes and the Jupura. Does this ground, composed probably of primitive rocks, like that which I examined more to the east, contain disseminated gold? Are there stream-works of gold more to the south, toward the

Is the *Canno* de la Luna this branch? or does it simply furnish the facility of a *portage*? We see that the communication of the Caqueta (Jupura) with the Upper Guainia, that is with the Rio Negro, above Maroa, is extremely doubtful, but another communication may be more reasonably admitted in the low and marshy ground, that extends to the north of the entrance of the Jupura into the Amazon. The small rivers Anany (Unini, Univini) and Yaumuhi (Jau), two tributary streams of the Rio Negro, issuing out between the Villa de Moura and Yau, communicate by the lake Atinineni (Ativini) with the Cadaya, the eastern most branchof the Jupura. (*Corog. brazil.*, tom. ii, p. 285 and 348.) Mr. Southey perhaps alludes to this branch in his *History of Brazil*, vol. i, p. 591. The communication which Mr. Requena supposes between the Puapua, a tributary of the Jupura, and two confluents of the Rio Negro, the Xivara (Chivara, Teyn), and the Unevixi (Uynuaxi), is only a portage.

* Near this strait, (founding the itinerary distances on the situation of San Fernando de Atabapo, in longitude 73° 45′) father Mancilla saw a chain of mountains, that skirted the horizon to the south.

Uaupes, on the Iquiare (Iguiari, Iguari), and on the Yurubesh (Yurubach, Urubaxi)? It was there Philip von Huten first sought El Dorado, and with a handful of men fought the battle of Omaguas, so celebrated in the sixteenth century. In separating what is fabulous from the narratives of the Conquistadores, we cannot fail to recognize in the names preserved on the same spots a certain basis of historic truth. We follow the expedition of Huten beyond the Guaviare and the Caqueta; we find in the Guaypes*, governed by the cacique of Macatoa, the inhabitants of the river of Uaupes, which also bears the name of *Guape*, or Guapue; we call to mind, that father Acunna calls the Iquiari (Quiquiare) a *gold river;* and that fifty years later father Fritz, a missionary of great veracity, received, in the mission of Yurimaguas, the Manaos (Manoas), adorned with plates of beaten gold, coming from the country between the Uaupes and the Caqueta, or Jupura. The rivers, that rise on the eastern declivity of the Andes (for instance the Napo) carry along with them a great deal of gold, even when their sources are found in trachytic soils. Why may there not be an alluvial auriferous soil to the east of the Cordilleras, as there is to the west, in the Sonora, at Choco, and at Barbacoas? I am far

* Fray Pedro Simon, p. 345.

from wishing to exaggerate the riches of this soil; but I do not think myself authorized to deny the existence of precious metals in the primitive mountains of Guyana for the single reason, that in our journey through that country we saw no metallic veins. It is somewhat remarkable, that the natives of the Oroonoko have a name in their languages for gold (*carucuru* in Caribbee, *caricuri* in Tamanac, *cavitta* in Maypure), while the word they use to denote silver, *prata*, is manifestly borrowed from the Spanish*. The notions collected by Acunna, father Fritz, and La Condamine, on the stream-works of gold south and north of the Rio Uaupes, agree with what I learnt of the auriferous soil of those countries. However great we may suppose the communications that took place between the nations of the Oroonoko before the arrival of the Europeans, they certainly did not draw their gold from the eastern declivity of

* The Parecas say, instead of *prata*, *rata* (Gili, vol. ii, p. 4). It is the Castillian word *plata* ill pronounced. Near the Yurubesh there is another inconsiderable tributary stream of the Rio Negro, the *Curicur-iari*. It is easy to recognize in this name the Caribbee word *carucur*, gold. The Caribbees pushed their incursions from the mouth of the Oroonoko south-west toward the Rio Negro; and it was this restless people, who carried the fable of El Dorado, by the same way, but in an opposite direction (from south-west to north-east), from the Mesopotamia between the Rio Negro and the Jupura to the sources of the Rio Branco.

the Cordilleras. This declivity is poor in mines, particularly in mines anciently worked; it is almost entirely composed of volcanic rocks in the provinces of Popayan, Pasto, and Quito. The gold of Guyana probably came from the country east of the Andes. In our days a lump of gold has been found in a ravine near the mission of Encaramada, and we must not be surprised, if, since the Europeans settled themselves in these wild spots, we hear less of the plates of gold, gold dust, and amulets of jade, which could heretofore be obtained from the Caribbee and other wandering nations by barter. The precious metals were never very abundant on the banks of the Oroonoko, the Rio Negro, and the Amazon; and disappeared almost entirely when the system of the missions caused the distant communications between the natives to cease.

The climate of the Upper Guainia is less hot, and perhaps somewhat less humid, than the climate of the banks of the Tuamini. I found the temperature of the water of the Rio Negro, in the month of May*, at 23·9°; the air being by day 22·7°, and at night 21·8° of the centigrade thermometer†. This coolness of the wa-

* 19·2° Reaumur, or 75° Fahrenheit.

† The following is a statement of the observations, which I made at San Carlos del Rio Negro, the sky being con-

ters, almost identical with that of the Rio Congo, is very remarkable in the proximity of the equator*. The Oroonoko, between four and eight degrees of latitude, has generally from 27·5° to 29·5° of temperature. The springs which issue from the granite at Maypures are at 27·8°. The decrease of heat, that is observed in approaching the equator, is singularly conformable to the hypotheses of some naturalists of antiquity†; it is however merely a local phenomenon, less owing to the height of the ground, than to a constantly rainy or cloudy sky, the humidity of the soil, the thickness of the forests, the evaporation of the plants, and the want of sandy beaches adapted to concentrate caloric

stantly cloudy. Height above the level of the sea, 125 toises.

May.	Barometer in lines.	Thermometer of Reaumur.	Whalebone Hygrometer.
8 at 21^h	328·2°	17·7°	54°
9 at 21^h	327·9	17·5	55
at 21^h 30′	328·2	17·6	57
at 22^h 30′	328·3	17·9	56·2
at 0^h	327·8	18·2	53
at 3^h 30′	327·6	18·4	51·3
at 4^h 15′	326·8	18·2	51·6
at 5^h 45′	327·2	18·2	52·1

The hygrometer kept up, while it did not rain, between 47° and 60° Deluc (83·4° and 90·2° Saussure).

* In 1° 53′ and 2° 15′ north latitude.

† *Geminus Isag. in Aratum*, c. 13, *Strabo, Geogr.*, lib. 2, p. 97.

and throw it off by radiation. The influence of a sky veiled by vapours is manifest in the stripe of the shore of Peru, where no rain ever falls, and the Sun, during a great part of the year, at the period of the *garua* (fog), displays itself to the naked eye like the disk of the Moon. Between the parallels of ten and twelve degrees of south latitude, the mean temperature is scarcely more elevated than at Algiers and Cairo*. It

* The following are the differences observed in the places at unequal distances from the equator, such as I have marked them in degrees of the centigrade thermometer, in the table of the climates of America. (See my work *De Distributione Geogr. Plantarum Secundum Cœli Temperiem et Alt. Mont.*, p. 92-94.)

Lima vel littora Oceani Pacifici inter 8° et 13° latitudinis australis, ubi sæpe terra quatitur; fulgura ex longinquo tantum conspiciuntur, nunquam autem audito tonitru. Folia a nullo imbre, sed a copioso rore madent, cœlo per medium annum velato, nubilo .. ..22·4°.

(Interdiu 23°-25·5°; noctu 15°-17°. Calor max. 28°; min. 13°).

Sylvæ Orinocenses summæ vastitatis, ob æstus fere intolerabiles, immanibus serpentibus, crocodilis, trigride jaguare atque vario et malefico genere animalium infestæ. Per tot secula homines Europæos latuerunt. Alt. 70-90 hex.; cal. med. ....27·6°.

Ripæ fluminis Guainiæ, a Hispanis *Rio Negro* dicti, quod Orinoci aquas per Cassiquiarem affluentes ad Amazonum amnem transmittit. Regia magnæ solitudinis propter limites Guyanæ et Brasiliæ, fere sine humani cultus vestigio, fruticum et procerarum arborum ferax, nec gignendæ herbæ apta. Obumbratus eam percurrit amnis et magnam ibi aquarum

rains on the banks of the Rio Negro almost the whole year, with the exception of the months of December and January. Even in the season of drought the blue sky is seldom seen during two or three days in succession. In serene weather the heat appears so much greater, as the rest of the year, although the nocturnal temperature is twenty-one degrees, the inhabitants complain of cold during the night. I repeated the experiments at San Carlos, which I had made at Javita, on the quantity of rain that falls in a given space of time. These researches are important for explaining the enormous swellings of the rivers near the equator, which were long thought to receive the snow-waters of the Cordilleras. I have seen fall at different times, in two hours, 7·5 lines; in three hours, 18 lines; in 9 hours, 48·2 lines. As it rains without intermission (a small, but very thick rain), I have thought, that the quantity of water, which falls annually in the forests, can not be less than ninety or one hundred inches. The justness of this estimation, however extraordinary it may appear, was confirmed by observations made with great care in the kingdom of New-Spain by the colonel of engineers, Mr. de

copiam, ex crebris imbribus collectam, in alimentum suum nemora ducunt: dies sæpe nubili; nocturno tempore aer spiritu fere movetur nullo. Alt. 130 hex.; cal. med.... 23·2°.

Costanzo. There fell at Vera-Cruz, in 1803, in the months of July, August, and September only, thirty-five inches two lines (*pied du roi*) ; in the whole year, sixty-two inches two lines of rain-water ; yet there is a great difference between the bare and arid climate of the coast of Mexico, and that of the forests. On that coast not a drop of rain falls in December or January ; and the months of February, April, and May, generally produce only from two inches to two inches three lines : at San Carlos, on the contrary, the atmosphere seems to resolve itself into water during nine or ten successive months. In these humid climates, the earth in the space of a year would be covered with a stratum of water eight feet deep, if there were no evaporation or flowing off of the fluid. These equatorial rains, which swell the majestic rivers of America, are accompanied by electric explosions ; and while at the extremity of that continent, on the western coast of Greenland, the noise of thunder is not heard once during five or six years* ; here, near the equator, the clouds are almost daily rumbling. The coincidence of the electric explosions and the rains, however, does

* The Chevalier Giseke, who resided seven years in the seventieth degree of latitude, saw lightning only once, during the long exile, to which he condemned himself from his love of the sciences. On the coast of Greenland the noise of avalanches, or that caused by the fall of ice, is often confounded with the sound of thunder.

not justify the ancient hypothesis of the formation of water in the air by the combination of oxygen and hydrogen. In vain has hydrogen been sought as far as three thousand six hundred toises of height. The quantity of water contained in saturated air augments much more rapidly from twenty to twenty-five degrees than from ten to fifteen degrees. A single degree of cooling produces consequently a greater quantity of visible vapours in the torrid than in the temperate zone. Air unceasingly renewed by the effect of currents may furnish by simple precipitation all the water, which so much strikes the imagination of philosophers in the equatorial rains.

The colour of the water of the Rio Negro is (by reflection) darker than that of the Atabapo or the Tuamini. I even saw with surprise, how little the mixture of the white waters of the Cassiquiare alters the tint below the fort of San Carlos. The author of the *modern Chorography of Brazil* justly observes*, that the river is of an amber colour, wherever it is shallow, and of a dark brown like coffee grounds, wherever the depth of the waters is considerable. The name of *Curana,* which is given by the natives to the

* Vol. ii, p. 336. We may be surprised to find M. de la Condamine attributing the denomination of Rio Negro "to the great transparency of that sea of fresh water, which the Amazon receives near the fort of Barra."

Lower Guainia, signifies also black water*. The junction of the Guainia or Rio Negro with the Amazon is considered of such importance in the government of *Grand Para*, that the *Rio das Amazonas* loses it's name west of the Rio Negro, and takes that of the *Rio dos Solimoes* (properly Sorimoes, in allusion to the poison of the nation of the Sorimans). The Amazon, to the west of the Ucayale, is called *Rio Maranhao*, or *Maranon*. The banks of the Upper Guainia in general abound much less in fishing birds, than those of the Cassiquiare, the Meta, and the Arauca, where ornithologists would find sufficient to enrich immensely the collections of Europe. This scarcity of animals arises no doubt from the want of shoals and flat shores, as well from the quality of the black waters, which (on account of their very purity) furnish less aliment to aquatic insects and fish. Notwithstanding this scarcity, the Indians of these countries, during two periods of the year, feed on *birds of passage*, which repose in their long migrations on the waters of the Rio Negro. When the Oroonoko begins to swell†, that is after the vernal equinox,

* Even farther north, the root *cur*, in the Maypure language, indicates what is black ; for in *curikini* (black colour) the last two syllables are but a termination of *quality*, as is proved by the words *marakini*, white ; *evakini*, yellow ; *coanitukini*, married.

† The swellings of the Nile take place much later than

an innumerable quantity of ducks (*patos careteros*) remove from eight and three degrees of north latitude, to one and four degrees of south latitude, toward the south-south-east. These animals then abandon the valley of the Oroonoko, no doubt because the increasing depth of the waters, and the inundations of the shores, prevent them from catching fish, insects, and aquatic worms. They are killed by thousands in their passage across the Rio Negro. When they go toward the equator, they are very fat and savoury; but in the month of September, when the Oroonoko decreases, and returns into it's bed, the ducks, warned either by the voice of the most experienced birds of passage, or by that internal feeling, which, not knowing how to define, we call instinct, return from the Amazon and the Rio Branco toward the north. At this period they are too lean to tempt the appetite of the Indians of the Rio Negro, and escape pursuit more easily from being accompanied by a species of herons (*gavanes*), which are excellent eating. Thus the Indians eat ducks in March, and herons in September. We could not learn what becomes of the *gavanes* during the swellings of the Oroonoko, and why they do

those of the Oroonoko; after the summer solstice, below Syene; and at Cairo in the beginning of July. The Nile begins to sink near that city generally about the 15th of October, and continues sinking till the 20th of May.

not accompany the *patos careteros* in their migration from the Oroonoko to the Rio Branco. These regular migrations of birds from one part of the tropics toward the other, in a zone which is during the whole year of the same temperature, are very extraordinary phenomena. The southern coasts of the West India islands receives also every year, at the period of the inundations of the great rivers of Terra Firma, numerous flights of the fishing birds of the Oroonoko, and of it's tributary streams. We must presume, that the variations of drought and humidity in the equinoctial zone have the same influence, as the great changes of temperature in our climates, on the habits of animals. The heats of summer, and the pursuit of insects, call the humming birds into the northern parts of the United States, and into Canada, as far as the parallels of Paris and Berlin; in the same manner a greater facility for fishing draws the palmipede and long legged birds from the north to the south, from the Oroonoko toward the Amazon. Nothing is more marvellous, and nothing is yet known less clearly in a geographical point of view, than the direction, extent, and term of the migrations of birds!

After having entered the Rio Negro by the Pimichin, and passed the small cataract at the confluence of the two rivers, we discovered, at the distance of a quarter of a league, the mission

of Maroa. This village, containing one hundred and fifty Indians, displayed an agreeable air of ease and prosperity. We purchased some fine species of the toucan (*piapoco*) alive; a courageous bird, the intelligence of which developes itself like that of our domestic ravens. We passed on the right, above Maroa, first the mouth of the Aquio*, then that of the Tomo†. On the banks of the last river dwell the Cheruvichahenas, some families of whom I have seen at San Francisco Solano. It is also remarkable for the

* Aqui, Aaqui, Ake of the most recent maps. The river has been well placed by d'Anville; Arrowsmith makes it recede two degrees too much to the west. From the mouth of the Pimichin to Maroa is $\frac{1}{4}$ *legua*; from Maroa to the Aquio $\frac{1}{2}$ *l.*; from the Aquio to the Tomo $\frac{5}{4}$ *l.*; from the Tomo to the Conorichite and the mission of Davipe 2 $\frac{1}{2}$ *l.* (1 *legua* = 2854 toises). The Indians of Maroa made known to me a tributary stream of the Rio Negro, which, coming from the north, flows in from seven to eight leagues west of their mission. They call it Asimasi.

† Tomui, Temujo, Tomon. New Portugueze maps, constructed at the Hydrographic Depot of Rio Janeiro, indicate strange interbranchings of the Tomon with a Rio Pama and the Rio Xie. This last name is nnknown to La Cruz and Caulin; but I have several motives for believing, that the great Rio Uteta (Ueteta), figured on our maps, and for which I made vain researches on the banks of the Rio Negro, is the Rio Guaicia or Xie. This identity appears to me to be proved more especially by the name of a tributary stream of the Uteta, which is called by Caulin the Rio Tevapuri; for there is a stream of this name flowing into the Guaicia.

clandestine communications which it favors with the Portugueze possessions. The Tomo lies near the Rio Guaicia (Xie), and the mission of Tomo sometimes receives by that way fugitive Indians from the Lower Guainia. We did not enter the mission, but father Zea related to us with a smile, that the Indians of Tomo and Maroa had been one day in full insurrection, because an attempt was made, to force them to dance the famous *dance of the devils*. The missionary had taken a fancy, to have the ceremonies by which the *piaches*, who are at once priests, physicians, and conjurors, evoke the evil spirit, *Iolokiamo*, represented in a burlesque manner. He thought, that the *dance of the devils* would be an excellent means of proving to the neophytes, that *Iolokiamo* had no longer any power over them. Some young Indians, confiding in the promises of the missionary, consented to act the devils, and were already decorated with black and yellow plumes, and jaguar skins with long sweeping tails. The place where the church stands was surrounded by the soldiers who are distributed in the missions, in order to add more effect to the counsels of the monks; and those Indians, who were not entirely satisfied with respect to the consequences of the dance, and the impotency of the evil spirit, were brought to the festivity. The party of the ancient and most timid however prevailed; all

were seized with a superstitious dread; all resolved to flee *al monte*, and the missionary adjourned his project of turning into derision the demon of the natives. What extravagant ideas present themselves to the imagination of an idle monk, who passes his life in the forests, far from every thing that can recall human civilization to his mind. The violence with which the attempt was made to execute in public at Tomo the mysterious dance of the devils is so much more strange, as all the books written by the missionaries relate the efforts they have used, to prevent the *funereal dances*, the *dances of the sacred trumpet*, and that ancient *dance of serpents*, the *Queti*, in which these wily animals are represented as issuing from the forests, and coming to drink with the men, in order to deceive them, and carry off the women.

After two hour's navigation from the mouth of the Tomo we arrived at the little mission of San Miguel de Davipe, founded in 1775, not by monks, but by a lieutenant of militia, Don Francisco Bobadilla. The missionary of the place, father Morillo, with whom we spent some hours, received us with great hospitality. He even offered us Madeira wine; but as an object of luxury we should have preferred wheaten bread. The want of bread becomes far more sensible in length of time than that of a spirituous liquor.

The Portugueze of the Amazon carry small quantities of Madeira wine, from time to time, to the Rio Negro; and the word *madera* signifying *wood* in the Castilian language, the poor monks, who are not much versed in the study of geography, had a scruple of celebrating mass with Madeira wine, which they took for a fermented liquor extracted from the trunk of some tree, like the palm wine; and requested the guardian of the missions to decide, whether the *vino de madera* were wine from grapes *(de uvas)*, or the juice of a tree *(vino de algun palo)*. At the beginning of the conquest, the question was agitated, whether it were allowable for the priests in celebrating mass, to use any fermented liquor analogous to the wine of the grape. The question, as might have been foreseen, was decided in the negative.

We bought some provision at Davipe, particularly fowls and a pig. This purchase interested our Indians much, who had been a long while deprived of meat. They pressed us to depart, in order to reach the island of Dapa, where the pig was to be killed, and roasted during the night. We had scarcely time to examine in the convent *(convento)* the great stores of *mani* resin, and cordage of the chiquichiqui palm, which deserves to be more known in Europe. This cordage is extremely light, floats upon the water, and is more durable in the navigation of

rivers than ropes of hemp. It must be preserved at sea by being often wetted, and little exposed to the ardor of the tropical sun. Don Antonio Santos, celebrated in the country for his journey in search of lake Parima, taught the Indians of the Spanish Rio Negro, to make use of the petioles of the chiquichiqui, a palm-tree with pinnate leaves, of which we saw neither the flowers nor the fruit. This officer is the only white man, who ever came from Angostura to Grand Para, in passing by land from the sources of the Rio Carony to those of the Rio Branco. He had studied the mode of fabricating ropes from the chiquichiqui in the Portugueze colonies; and, after his return from the Amazon, he introduced this branch of industry into the missions of Guyana. It were to be wished, that extensive rope walks could be established on the banks of the Rio Negro and the Cassiquiare, in order to make these cables an article of trade with Europe. A small quantity is already exported from Angostura to the West Indies; and costs from fifty to sixty per cent less than cordage of hemp*. Young palm trees only

* A cable of chiquichiqui, sixty-six varas (171 *pieds de roi*) long, and five inches four lines in diameter, costs the missionary twelve great piastres; and is sold at Angostura for twenty-five piastres. A rope one inch diameter, and seventy varas (one hundred and eighty-two *pieds de roi*) long, sells in the missions for three piastres; on the coast for five.

being employed, they must be planted and carefully cultivated.

A little above the mission of Davipe, the Rio Negro receives a branch of the Cassiquiare, the existence of which is a very remarkable phenomenon in the history of the branchings of rivers. This branch issues * from the Cassiquiare, north of Vasiva, bearing the name of the Itinivini; and, after having traversed for the length of twenty-five leagues a flat country, almost entirely destitute of inhabitants, falls into the Rio Negro under the name of the Rio Conorichite. It appeared to me to be more than one hundred and twenty toises broad near it's mouth, and it augments the volume of it's black waters by a great mass of white. Although the current of the Conorichite is very rapid, this natural canal abridges three days of the navigation from Davipe to Esmeralda. We cannot be surprised

* I describe the Itinivini (or rather *Itiniveni*, water, *veni*, of Itin) according to the ideas given me at the mouth of that river, which is the effect of a second bifurcation, a branch of a branch of the Oroonoko. Father Caulin, much more exact in general than those who constructed the map of his work, asserts, that the communication of the Conorichite with the Cassiquiare is owing to a bifurcation of the Canno Meë, which is a tributary stream of the Conorichite. Our maps, while they arbitrarily suppress the communication between Davipe and Vasiva, place a small fort (*fuerto*) in the midst of this desert.

at a double communication between the Cassiquiare and the Rio Negro, when we recollect, that so many rivers of America form a species of *deltas* at their confluence with other rivers. Thus the Rio Branco and the Rio Jupura enter by a great number of branches into the Rio Negro and the Amazon. At the confluence of the Jupura there is a much more extraordinary phenomenon. Before this river joins the Amazon, the latter, which is the principal recipient, sends off three branches called Uaranapu, Manhama, and Avateparana, to the Jupura, which is but a tributary stream. The Portugueze astronomer, Mr. Ribeiro, has proved this important fact*. The Amazon gives waters to the Jupura itself, before it receives this tributary stream.

The Rio Conorichite or Itinivini served powerfully heretofore, to facilitate the trade in slaves carried on by the Portugueze in the Spanish territory. The slave traders went up by the Cassiquiare and the Canno Meë to Conorichite; and thence dragged their canoes by a *portage* to the *rochelas* of Manuteso, in order to enter the Atabapo. I have marked this road in my itinerary map of the Oroonoko. This abomina-

* There are great changes to be made in our maps relatively to the eight pretended branches of the Jupura. Compare Southey's History of Brazil, p. 595, and the *Corogr. Bras.*, p. 285.

ble trade lasted till about the year 1756; when the expedition of Solano, and the establishment of the missions on the banks of the Rio Negro, put an end to it. Ancient laws of Charles V and Philip III had forbidden * under the most severe penalties (such as the being rendered incapable of civil employment, and a fine of two thousand piastres), "converting the natives to the faith by violent means, and sending armed men against them;" but notwithstanding these wise and humane laws, the Rio Negro, in the middle of the last century, was no farther interesting in European politics, according to the expression of M. de la Condamine, than as it facilitated the *entradas*, or hostile incursions, and favoured the purchase of slaves. The Caribbees, a trading and warlike people, received from the Portugueze and the Dutch knives, fish-hooks, small mirrors, and all sorts of glass beads. They excited the Indian Chiefs to make war against each other, bought their prisoners, and carried off themselves by stratagem or force all whom they found in their way. These incursions of the Caribbees comprehended an immense extent of land; they went from the banks

* Ley de Carlos V, (Valladolid, 26 En. 1523) *que no se puede hacer guerra a los Indios para que reciben la Santa Fe Catolica.* Ley de Filippe III (del 10 Oct. 1618) *que no se envia gente armada a reducir Indios.*

of the Essequebo and the Carony, by the Rupunuri* and the Paraguamuzi† on one side, directly south, toward the Rio Branco; and on the other, to the south-west, following the portages between the Rio Paragua‡, the Caura, and the Ventuario ||. The Caribbees, when arrived amid the numerous tribes of the Upper Oroonoko, divided themselves into several bands, in order to reach, by the Cassiquiare, the Cababury, the Itinivini, and the Atabapo, on a great many points at once, the banks of the Guainia or Rio Negro, and carry on the slave-trade with the Portugueze. Thus the unhappy natives, before they came into immediate contact with the Europeans, suffered from their neighbourhood.

* There is a portage between the Rio Rupunuri, or Rupunuvini, a tributary stream of the Essequebo, and the Canno Pirara, a tributary stream of the Rio Parime, or Rio Branco.

† To go from the Paraguamuzi, which flows into the Rio Carony, to the *Canno* Curaricara (Uraricuera ?), a tributary stream of the Rio Parime, you pass the chain of the mountains of Quimiropaca, which, stretching from west to east, unites the mountains of the Upper Oroonoko with those of Dutch and French Guayana.

‡ You pass from the Caura to the Carony by a portage between the Chavarro, which flows into the Caura, and the Paruspo, which falls into the Paragua, one of the tributary streams of the Carony.

|| In going from the Caura to the Ventuario, you cross the savannahs that separate the sources of the Erevato, a tributary stream of the Caura, from those of the Manapiare, which flows into the Ventuario.

The same causes produce every where the same effects. The barbarous trade, which civilized nations have carried on, and still continue in part, on the coast of Africa, extends it's fatal influence even to regions, where the existence of white men is unknown.

Having quitted the mouth of the Conorichite, and the mission of Davipe, we reached at sunset the island of Dapa, lying in the middle of the river, and in a very picturesque situation. We were astonished to find on this spot some cultivated ground, and on the top of a small hill an Indian hut. Four natives were seated round a fire of brush-wood, and eating a sort of white paste with black spots, which much excited our curiosity. These were *vachacos*, large ants, the hinder parts of which resemble a lump of grease. They had been dried, and blackened by smoke. We saw several bags of them suspended above the fire. These good people paid little attention to us; yet there were more than fourteen persons in this confined hut, lying naked in hammocks placed one above another. When Father Zea arrived, he was received with great demonstrations of joy. The military are in greater numbers on the banks of the Rio Negro, than on those of the Oronooko, on account of guarding the frontiers; and wherever soldiers and monks dispute for power over the Indians, the latter are most attached to the

monks. Two young women came down from their hammocks, to prepare for us cakes of cassava. We inquired of them by an interpreter, whether the soil of the island were fertile; they answered, that cassava grew poorly, but that it was a *good land for ants*, and food was not wanting. In fact, these *vachacos* furnish subsistence to the Indians of the Rio Negro and the Guainia. They do not eat the ants from luxury, but because, according to the expression of the missionaries, the *fat* of ants (the white part of the abdomen) is a very substantial food. When the *cakes* of cassava were prepared, Father Zea, whose fever seemed rather to sharpen than enfeeble his appetite, ordered a little bag to be brought to him filled with *smoked vachacos*. He mixed these bruised insects with flour of cassava, which he pressed us to taste. It somewhat resembled rancid butter, mixed with the crumb of bread. The cassava had not an acid taste, but some remains of European prejudices prevented our subscribing to the praises bestowed by the good missionary on what he called an excellent *paste of ants*.

The violence of the rain obliged us to sleep in this encumbered hut. The Indians slept only from eight till two in the morning, the rest of the time they conversed in their hammocks, prepared their bitter beverage of cupana, threw fresh fuel on the fire, and complained of cold,

although the temperature of the air was at 21°. This custom of being awake, and even on foot four or five hours before sunrise, is general among the Indians of Guyana. When in the *entradas* an attempt is made to surprise the natives, the hours chosen are those of the first sleep, from nine 'till midnight.

We left the island of Dapa long before daybreak; and notwithstanding the rapidity of the current, and the zeal of our rowers, we only arrived at the foot of San Carlos del Rio Negro after twelve hours of navigation. We passed on the left the mouth of the Cassiquiare, and, on the right, the small island of Cumarai. This fort is believed in the country to be placed on the equatorial line*; but, according to the observations which I made at the rocks of Culimacari, it is in 1° 54′ 11″. Every nation has a tendency to enlarge the space occupied by it's possessions on the map, and to extend their limits. The reduction of itinerary distances to distances in a right line being neglected, the frontiers are always most disfigured. The Portugueze, set-

* Before my visit to the Rio Negro in 1801, and before the first results of my observations were published by M. Lalande, and baron von Zach, the best maps placed San Carlos (according to la Cruz and Surville) in 0° 53′ of north latitude. Till that period no astronomical observations had been made between San Carlos, Esmeralda, San Fernando de Atabapo, and Javita.

ting out from the Amazon, place San Carlos* and San Jose de Maravitanos too far to the north, while the Spaniards, setting out from the coast of Caraccas, assign to them too southern a position. This consideration may be applied to all the maps of the colonies. If we know where they have been drawn, and in what direction the persons arrived at the frontiers, we may foresee to what side the errors in latitude and longitude will lean.

We lodged at San Carlos with the commander of the fort, who is a lieutenant of militia. From the top of a gallery of the house we enjoyed a delightful view of three islands of great length†, and covered with thick vegetation. The river runs in a straight line from north to south, as if it's bed had been dug by the hand of man. The sky being constantly cloudy gives those countries a solemn and gloomy character. We found in the village a few juvia trees; that majestic plant, which furnishes the triangular nuts called in Europe the almonds of the Amazon. We have made it known by the name of the bertholletia excelsa. The trees acquire the height of thirty feet.

* Thus the manuscript map of Mr. Requena, founded on the astronomical observations of the Portugueze, places San Carlos 1° 27′ more to the north than the Spanish maps, founded on the journals of Solano's expedition.

† The islands of Zaruma, Imipa, and Mibita, or Mine.

The military establishment of this frontier consisted of seventeen soldiers, ten of whom were detached for the security of the neighbouring missions. The humidity of the air is such, that there are not four muskets in a condition to be fired. The Portugueze have from twenty-five to thirty men, better clothed and armed, at the little fort of San Jose de Maravitanos. We found in the mission of San Carlos but one *garita*, a square house, constructed with unbaked bricks, and containing six field pieces. The little fort, or, as they think proper to call it here, the *Castillo de San Felipe*, is situate opposite San Carlos, on the western bank of the Rio Negro. The commander made some scruple of showing the *fortaleza* to Mr. Bonpland and me; our passports expressed clearly the power of measuring mountains, and performing trigonometric operations on the land, whenever we thought proper; but not of seeing fortified places. Our fellow traveller, Don Nicholas Solo, a Spanish officer, was more fortunate than ourselves; he was permitted to pass the river. He found in a small plain, stripped of it's wood, the commencement of a fortification of earth, which, had it been finished, would have required five hundred men for it's defence. It is a square structure, the ditch of which is scarcely visible. The parapet is five feet high, and strengthened by large stones. There are two bastions on the

side next the river, on which four or five pieces of cannon may be placed. The whole fortification contains fourteen or fifteen cannons, the greater part dismounted, and guarded by two men. Three or four Indian huts surround the fort. This is what is called by the name of the village of San Felipe; and, to make the ministry of Madrid believe how much these Christian settlements increase, separate parochial registers are kept for this pretended village. Every evening after the *Angelus* a report was made to the commander, announcing to him gravely, that all appeared quiet around the fortress; it recalled to me what travellers relate of the small forts raised on the coast of Guinea, to protect the European factories, which have garrisons of four or five men. The soldiers of San Carlos are not happier than those of the African factories; for at places so distant the same abuses prevail in the military administration. According to a custom very anciently tolerated, the chiefs do not pay the troops in money, but deliver to them clothing *(ropa)*, salt, and provision, at a high price. There exists such a dread at Angostura of being detached, or rather exiled to the missions of the Carony, the Caura, and the Guainia, that it is difficult to find recruits. Subsistence is excessively dear on the banks of the Rio Negro, because very little cassava and few plantains are cultivated, and the river (like

all those with black and limpid waters) is ill stored with fish. The best of their provision comes from the Portugueze settlements on the Rio Negro, where more ease and industry reign among the Indians; and yet the trade with the Portugueze is scarcely an object of two thousand piastres of annual importation *.

The banks of the Upper Guainia will be more productive, when the destruction of the forests has diminished the excessive humidity of the air and the soil, and the insects, which devour the roots and leaves of the herbaceous plants, are reduced in number. In their present state of culture, maize scarcely grows, and the tobacco†, which is of the finest quality, and much celebrated on the coast of Caraccas, is well cultivated only on spots amid old ruins, remains of the huts of the *pueblo viejo*. Thanks to the nomade habits of the natives, enough of these ruins are found, where the earth has been dug and exposed to the air, without producing plants. The tobacco sowed in forests recently

* Price at San Carlos; maize, the *fanega*, three piastres and a half; coffee, the pound (thirty-two Castillian ounces) one rial of plate; sarsaparilla, the pound, one piastre; rice, the almuda, five reals.

† By the names of *andullos del Rio Negro, y del Alto Orinoco*. At the Rio Negro fifteen tobacco plants furnish two pounds of excellent tobacco. The leaves are carefully dried, and formed into carrots fifteen inches long, which are tied round with packthread.

cut down is watery, and without flavour. Indigo grows wild near the villages of Maroa, Davipe, and Tomo. Under a different system from that which we found in those countries, the Rio Negro will produce indigo, coffee, cacao, maize, and rice in abundance.

The voyage from the mouth of the Rio Negro to Grand-Para occupying only twenty or twenty-five days, it would not have taken us much more time to have gone down the Amazon as far as the coast of Brazil, than to return by the Cassiquiare and the Oroonoko to the northern coast of Caraccas. We were informed at San Carlos, that, on account of political circumstances, it was difficult at that moment to pass from the Spanish to the Portugueze settlements; but we did not know till after our return to Europe the extent of the danger, to which we should have been exposed in proceeding as far as Barcellos. It was known at Brazil, perhaps by means of the newspapers, the well-meant but indiscreet zeal of which has so often proved injurious to travellers, that I was going to visit the missions of the Rio Negro, and examine the natural canal, which unites two great systems of rivers. In those desert forests instruments had been seen only in the hands of the commissioners of boundaries; and at that time the subaltern agents of the Portugueze government could no more conceive than the good missionary,

whom I have mentioned in a former chapter, how a man of sense could expose himself to the fatigues of a long journey, "to measure lands that did not belong to him." Orders had been issued, to seize my person, my instruments, and above all those registers of astronomical observations, so dangerous to the safety of states. We were to be conducted by way of the Amazon to Grand Para, and thence sent back to Lisbon. If I mention these projects, the success of which would have had so untoward an influence on the duration of a journey calculated to last five years, it is only to prove how much the spirit, that animates the government of colonies, differs in general from that which directs the affairs of the mother country. The ministry of Lisbon, informed of the zeal of it's subaltern agents, instantly gave orders, that I should not be disturbed in my operations; but that on the contrary they should be encouraged, if I traversed any part of the Portugueze possessions. From this enlightened ministry I received the first news of the solicitude of which I had been the object, and to which at that remote distance I could not have appealed.

We found among the Portugueze at San Carlos several military men, who had gone from Barcellos to Grand Para. I shall here collect together all I could learn respecting the course of the Rio Negro. It being very rare for any

one to go up the Amazon beyond the mouth of the Cababuri, a river celebrated for the collection of sarsaparilla, all that has been recently published, even at Rio Janeiro, on the geography of those countries, is extremely confused. In going down the Guainia, or Rio Negro, you pass on the right the *Canno* Maliapo, and on the left the Cannos Dariba and Eny. At five leagues distance, consequently nearly in 1° 38′ of north latitude, is the island of San Josef, which is provisionally recognized (for in the interminable dispute of the boundaries every thing is provisional) as the southern extremity of the Spanish possessions. A little below this island, in a spot where there are a great number of orange-trees now growing wild, you are shown a small rock, two hundred feet high, with a cavern called by the missionaries the *Glorieta* de Cocuy. This *summer-house*, for such is the signification of the word *glorieta* in Spanish, recalls however remembrances, that are not the most agreeable. It was there that Cocuy, the chief of the Manitivitanoes, of whom we have spoken above*, had his *harem* of women, and where (to tell the whole), from a peculiar predilection, he devoured the finest and fattest. I have no doubt, that Cocuy

* P. 206, 207 of the present volume. At San Carlos an instrument of music is still preserved, a kind of large drum, ornamented with very rude Indian paintings, which relate to the exploits of Cocuy.

was a little of a cannibal; "it is," says father Gili, with the simplicity of an American missionary, "a bad habit of these people of Guyana, in other respects so good, and so mild;" but truth obliges me to add, that the tradition of the harem and the orgies of Cocuy is more current in the Lower Oroonoko, than on the banks of the Guainia. At San Carlos the very suspicion of an action so degrading to human nature is rejected; is this because the son of Cocuy, who is become a Christian, and who appeared to me an intelligent and civilized man, is at present captain of the Indians of San Carlos?

Below the *Glorieta*, on the Portugueze territory, are the fort of San Josef de Manavitanos, the villages of Joam Baptista de Mabbe, San Marcellino (near the mouth of the Guaisia, or Uexie, of which we have often spoken above), Nossa Senhora da Guya, Boavista near the Rio Izanna, San Felipe, San Joaquin de Coanne at the confluence* of the famous Rio Guape, Calderon, San Miguel de Iparanna with a small fort, San Francisco de las Caculbaes, and, finally, the fortress of San Gabriel de Cachoeiras. I enter expressly into this geographical detail, to show how many settlements the Portugueze government have formed, even in this remote

* See above, p. 312.

part of Brazil. There are eleven villages in an extent of twenty-five leagues. I know of nineteen more as far as the mouth of the Rio Negro, beside the six towns of Thomare, Moreira (near the Rio Demenene or Uaraca, where dwelt anciently the Guyana Indians), Barcellos*, San Miguel del Rio Branco, near the river of the same name, so well known in the fictions on El Dorado, Moura, and Villa do Rio Negro. The banks of this tributary stream of the Amazon alone are consequently ten times more peopled than all those of the Upper and Lower Oroonoko, the Cassiquiare, the Atabapo, and the Spanish Rio Negro, together. This contrast depends little on the different fertility of the soil, or the greater facility of navigation which the Rio Negro affords, by preserving the same direction from north-west to south-east. It is the effect of political institutions. Under the colonial system of the Portugueze, the Indians are dependant at the same time on the civil and military chiefs, and the ecclesiastics of Mount Carmel; it is a mixed government, in which the secular power preserves it's independance. The monks of the Observance, who are the missionaries of the Oroonoko, unite on the contrary all power in one hand. Both these

* At the confluence of the Rio Buhybuhy. The town heretofore stood forty leagues higher up, a circumstance which has occasioned great confusion in the modern maps.

governments are vexatious in many points of view; but the loss of liberty is at least compensated in the Portugueze colonies by somewhat more of ease and civilization.

Among the tributary streams which the Rio Negro receives from the north, three ought to fix particularly our attention, because on account of their branchings, their portages, and the situation of their sources, they have a marked influence on the problem so often debated of the origin of the Oroonoko. The most southern of these tributary streams are the Rio Branco*,

* As the names Rio Branco and Rio Parime signify in Portugueze and in Caribbee *river of white waters*, and *great water*, it is natural, that these expressions, applied to different tributary streams at once, have caused many errors in geography. The great Rio Branco, or Parime, often mentioned in this work, is formed by the Urariquera and the Tacutu, and flows, between Carvoeyro and Villa de Moura, into the Rio Negro. It is the Quecuene of the natives; and forms at it's confluence with the Rio Negro a very narrow Delta, between the principal trunk and the Amayauhau, which is a little branch more to the west. The ancient maps of D'Anville, La Cruz, and Caulin, enlarge this Delta in a fabulous manner, and exhibit all the rivers that flow into the Rio Negro, for the distance of forty leagues, between the ancient mission of Dari and Carvoeyro, as branches of the Rio Branco. Thus the Daraha, the Padaviri, and the Uaraca, which are tributary streams, independant of each other, have received the names of fourth, third, or second *branch*; thus the great Rio Parime, or Quecuene, has been sometimes distinguished from another Rio Branco, which is the Pada-

which was long believed to issue conjointly with the Oroonoko from lake Parima ; and the Rio Padaviri, which communicates by a portage with the Mavaca, and consequently with the Upper Oroonoko, to the east of the mission of Esmeralda. We shall have occasion to speak of the Rio Branco and the Padaviri, when we arrive in that mission ; it suffices here to pause at the third tributary stream of the Rio Negro, the Cababury, the interbranchings of which with the Cassaquiáre are alike important in their connexion with hydrography, and with that of the trade in sarsaparilla.

The lofty mountains of Parime, which border the northern bank of the Oroonoko in the upper part of it's course above Esmeralda, send off a chain toward the south, of which the Cerro de Unturan forms one of the principal summits. This mountainous country of small extent, but rich in vegetable productions, above all in the *mavacure* liana, employed in the fabrication of the *curare* poison, in almond-trees (the *juvia*,

viri, because it is placed between the Villa de Thomare and Lamalongo. D'Anville calls almost all the rivers which have white waters, *aguas brancas, Rio Branco.* To be convinced of the extreme confusion, which still prevails in the geography of the Rio Negro, it will suffice, to compare the names of the tributary streams and the missions on the maps, *alike minute*, of La Cruz, Caulin, Faden, and Arrowsmith, with the corresponding names on the maps in the *hydrographic dépot* at Rio Janeiro.

or bertholletia excelsa), in aromatic *pucheries*, and in wild cacao trees, forms a point of division between the waters that flow to the Oroonoko, the Cassiquiare, and the Rio Negro. The tributary streams on the north, or of the Oroonoko, are the Mavaca and the Daracapo; those on the west, or of the Cassiquiare, are the Idapa and the Pacimoni* ; and those on the south, or of the Rio Negro, are the Padaviri and the Cababuri†. The latter is divided near it's source into two branches, the westernmost of which is known by the name of Baria‡. The Indians of the mission of San Francisco Solano gave us the most minute descriptions of it's course. It affords the very rare example of a branch, by which an inferior tributary stream, instead of

* Pasimona, and even Baximonari, in maps.

† Cavaboris, Cababuris, Cabury, Cauhabury, and even Catabuhu, in maps. It appears, that the Baria, which forms a natural channel of efflux, is sometimes dry in very hot summers (*Corogr. Bras.*, vol. ii, p. 554). The upper part of the Cababuri was called Maturaca (Meturacao) ; the branch which flows into the Pacimoni bears the name of Iminara (Umariuani, Umarynauhy, Umanivari,) and afterward the name of Baria.

‡ The waters of the Baria, which is a branch of the Cababuri, run toward the west, and mingle themselves successively with those of the Pacimoni, the Cassiquiare, and the Rio Negro. As this last river flows toward the east, the waters of the Baria, after a circuit of one hundred and ten leagues, reach the mouth of the Cababuri.

receiving the waters of the superior stream, sends on the contrary a part of it's own waters to that stream, in a direction opposite to that of the principal recipient. I have collected on one plate of my Atlas several examples of these ramifications with countercurrents, these apparent movements against the general slope, these bifurcations of rivers, the knowledge of which is interesting to hydrographic engineers. This plate will remind them, that they must not consider as chimerical all that deviates from the type, which we have formed for ourselves from observations collected in too limited a part of the Globe.

The Cababuri runs into the Rio Negro near the mission of Nossa Senhora das Caldas; but the rivers Ya and Dimity*, which are higher tributary streams, have communications also with the Cababuri; so that, from the little fort of San Gabriel de Cachoeiras † as far as San Antonia de Castanheira the Indians of the Portugueze possessions can enter the territory of the Spanish missions by the Baria and the Pacimoni. If I employ the word territory, it is according to the practice of the monks of the Ob-

* Bimitti, or Cunimiti.

† There is an uninterrupted succession of small cataracts from San Gabriel as far as San Bernardo. The most considerable is near the first of these places, and is called Cachoeira de Crocobi or Corocuvi.

servance. We scarcely know on what the right of property is founded in those uninhabited countries, the natural limits of which are unknown, and which no attempt has been made to cultivate. The inhabitants of the Portugueze missions assert, that their territory extends to all the spots at which they can arrive in a boat upon a river, the mouth of which is in the Portugueze possessions. But occupation does not always constitute a right of property; and, according to what we have shown of the multiplied interbranchings of rivers, it might prove alike dangerous for the courts of Madrid and of Lisbon, to sanction this strange axiom of the jurisprudence of the missions.

The chief object of the incursions by the Rio Cababuri is the collection of *sarsaparilla* and the aromatic seeds of the puchery laurel (laurus pichurim). These valuable articles of commerce are sought for as far as two days journey from Esmeralda, on the borders of a lake, which is on the north of the Cerro Unturan, passing by portages from the Pacimoni to the Idapa, and from the Idapa to the Mavaca, near the lake of this name. The *sarsaparilla* of these countries is celebrated at Grand Para, Angostura, Cumana, Nueva Barcelona, and in other parts of Terra Firma, by the name of *zarza del Rio Negro*. It is the most active of all that are known, and is much preferred to the *zarza* of

the province of Caraccas, or of the mountains of Merida; it is dried with great care, and exposed purposely to smoke, in order that it may become blacker. This liana grows in profusion on the humid declivities of the mountains of Unturan and Achivaquery. M. de Candolle* is right in suspecting, that different species of smilax are gathered under the name of sarsaparilla. We found twelve new species, among which the smilax siphilitica of the Cassiquiare, and the s. officinalis of the river Magdalena†, are the most esteemed on account of their diuretic properties. Syphilitic maladies being as common as benign in these countries among the whites and the mixed casts, the quantity of sarsaparilla employed in the Spanish colonies as a domestic medicine is very considerable. We see by the works of Clusius, that at the beginning of the *Conquista* Europe obtained this salutary medicament from the Mexican coast of Honduras‡ and the port of Guayaquil. The trade in *zarza* is now more active in those ports, which have interiour communications with the Oroonoko, the Rio Negro, and the Amazon.

The trials made in several botanical gardens of Europe prove, that the smilax glauca of Vir-

* *Propr. medic.*, p. 292.

† See our *Nov. Gen*, vol. i, p. 271.

‡ Near five thousand quintals are annually exported from Vera Cruz. See my Polit. Essay, vol. ii, p. 442.

ginia, which it is pretended is the s. sarsaparilla of Linneus, may be cultivated in the open air, wherever the mean temperature of the winter rises above six or seven degrees of the centigrade thermometer*; but those species that possess the most active virtues belong exclusively to the torrid zone, and require a much higher degree of heat. In reading the works of Clusius, it can scarcely be conceived, why our writers on the *materia medica* persist in considering a plant of the United States as the most ancient type of the officinal species of the genus smilax.

We found in the possession of the Indians of the Rio Negro some of those *green stones*, known by the name of the *Amazon stones*, because the natives pretend, according to an ancient tradition, that they come from the country "of the *women without husbands* (*Cougnantainsecouima*), or *women living alone* (*Aikeambenano*†)." We

* The winter temperature at London and Paris is 4·2° and 3·7°; at Montpellier, 6·7°; at Rome, 7·7°; in that part of Mexico, and the Terra Firma, where we saw the most active species of the sarsaparilla growing, (that which supplies the trade of the Spanish and Portugueze colonies) from twenty to twenty-six degrees cent. The roots of another family of monocotyledons (of some cyperaceæ) possess also diaphoretic and resolvent properties. The carex arenaria, the c. hirta, &c. furnish the *German sarsaparilla* of druggists. According to Clusius, Europe received the first sarsaparilla from Jucatan, and the island of Puna, opposite Guayaquil.

† This word is of the Tamanac language; they are the *Sole Donne* of the Italian missionaries.

were told at San Carlos, and in the neighbouring villages, that the sources of the Oroonoko, which we found east of the Esmeralda; and in the missions of the Carone and at Angostura, that the sources of the Rio Branco are the native spots of the green stones. These indications confirm the report of an old soldier of the garrison of Cayenne, mentioned by M. de la Condamine, that these mineral substances were obtained from the *country of women*, west of the rapids of the Oyapoc. The Indians who inhabit the fort of Topayos on the Amazon, five degrees east of the mouth of the Rio Negro, possessed formerly a great number of these stones. Had they received them from the north, that is from the country pointed out by the Indians of the Rio Negro, which extends from the mountains of Cayenne toward the sources of the Essequebo, the Carony, the Oroonoko, the Parime, and the Rio Trombetas*? or did they come from the south by the Rio Topayos, which descends from the vast table-land of the Campos Parecis? Superstition attaches great importance to these mineral substances; they are worn suspended from the neck as amulets, because, according to popular belief, they preserve the wearer from nervous complaints, fevers, and the sting of

* Between 57° and 67° of longitude, and 0° and 5° of north latitude.

venomous serpents. Thus they have been for ages an article of trade among the natives, both in the north and on the south of the Oroonoko. The Caribbees, who may be considered as the Bucharians of the New World, made them known on the coast of Guyana; and the same stones, like money in circulation, having passed successively from nation to nation in opposite directions, their quantity is perhaps not augmented, and the spot which produces them is rather unknown than concealed. In the midst of enlightened Europe, on occasion of a warm contest respecting native bark, a few years ago, the green stones of the Oroonoko were gravely proposed as a powerful febrifuge. After this appeal to the credulity of the Europeans, we cannot be surprised to learn, that the Spanish planters share the predilection of the Indians for these amulets, and that they are sold at a very considerable price*. The form given to them most frequently is that of the Persepolitan cylinders†, longitudinally perforated, and loaded with inscriptions and figures. But it is not the Indians of our days, the natives of the Oroonoko and the Amazon, whom we find in the last degree of barbarism, that pierced such hard substances,

* The price of a cylinder two inches long is from twelve to fifteen piastres.

† Dorow, *ueber die Assyrische Keilschrift*, 1820, p. 4.

giving them the forms of animals and fruits. Such works, like the perforated and sculptured emeralds, which are found in the Cordilleras of New Grenada and Quito, denote anterior civilization. The present inhabitants of those countries, particularly those of the hot region, so little comprehend the possibility of cutting hard stones, (the emerald, jade, compact feldspar, and rock-crystal), that they imagine the *green stone* is naturally soft when taken out of the earth, and hardens after having been moulded by the hand.

It results from these observations, that the natural soil of the Amazon stone is not in the valley of the river Amazon; and that, far from deriving it's name from the river, it has obtained it, as well as the river itself, from a nation of warlike women, whom Father Acunna, and Oviedo in his letter to Cardinal Bembo, compare to the Amazons of the ancient world. What we see in our cabinets under the false denomination of Amazon stone (*amazonenstein*), is neither jade, nor compact feldspar, but a common feldspar of an apple-green colour, that comes from the Ourals and lake Onega in Russia, and which I never saw in the granitic mountains of Guyana. Sometimes also this very rare and hard stone of the Amazons is confounded with the hatchet-nephrite (*beilstein*)* of Werner, which has much

* Punamustein, jade axinien. The stone-hatchets found

less tenacity. The substance which I obtained from the hands of the Indians, belongs to the *saussurite* *, to the real jade, which approaches oryctognostically to compact feldspar, and which forms one of the constituent parts of the *verde de Corsica*, or gabbro †. It takes a fine polish, and passes from apple-green to emerald-green; it is translucent at the edges, extremely tenacious, and sonorous to such a degree, that, being formerly cut by the natives into very thin plates, perforated at the centre, and suspended by a thread, it yields an almost metallic sound, if struck by another hard ‡ body. This observation adds to the connection which we find, notwithstanding the difference of fracture and of specific gravity, between the saussurite and the petrosiliceous basis of the *porphyrschiefer*, which

in America, for instance in Mexico, are not of *beilstein*, but of compact feldspar.

* Jade of Saussure, according to the system of Brongniart; tenacious jade, and compact tenacious feldspar of Haüy; some varieties of the variolithe of Werner.

† Euphotide of Haüy, or schillerfels of Raumer. (See the classical memoir of Mr. Leopold von Buch, *ueber den Gabbro* in the *Mém. de la Société d'Hist. Nat. de Berlin*, 1810, vol. 4, p. 134.)

‡ M. Brongniart, to whom I showed these plates on my return to Europe, very justly compared these jades of Parime to the sonorous stones employed by the Chinese in their musical instruments called *king*. *Traité de Min.* vol. i, p. 265.

is the phonolite (*klingstein*). I have already observed, that, as it is very rare to find in America nephrite, jade, or compact feldspar in it's native place, we may well be astonished at the quantity of hatchets, which are every where discovered in digging the earth, from the banks of the Ohio as far as Chili. We saw in the mountains of the Upper Oroonoko, or of Parime, only granular granites containing a little hornblend, granites passing into gneiss, and schistoid hornblends. Has nature repeated on the east of Esmeralda, between the sources of the Carony, the Essequebo, the Oroonoko, and the Rio Branco, the transition formation of Tucutunemo* reposing on mica-schist? Does the Amazon stone come from the rocks of euphotide, which form the last member of the series of primitive rocks?

We find among the people of both worlds at the first degree of dawning civilization, a peculiar predilection for certain stones; not only for those which from their hardness may be useful to man as cutting instruments†, but also for mineral substances, which, on account of their colour and their natural form, he be-

* See vol. iv, p. 284, and my Researches on the American Monuments, vol. ii (xiv of the present work), 38.

† The lydian stone, the kieselschiefer, the axinian jade, the obsidian, &c.

lieves to bear some relation to the organic functions, and even to the propensities of the soul. This ancient worship of stones, these benign virtues attributed to jade and hematite, belong to the savages of America as well as to the inhabitants of the forests of Thrace, whom the venerable institutions of Orpheus, and the origin of mysteries, forbid us to consider as savages. The human race, when nearer it's cradle, believes itself to be autocthonic, and feels as if it were enchained to the Earth, and the substances contained in her bosom. The powers of nature, and still more those which destroy, than those which preserve, are the first objects of it's worship. It is not solely in the tempest, in the sound that precedes the earthquake, in the fire that feeds the volcano, that these powers are manifested; the inanimate rock, the stones by their lustre and their hardness, the mountains by their mass and their solitude, act upon the untaught mind with a force, which in a state of advanced civilization can no longer be conceived. This worship of stones, when once established, is preserved amid more modern forms of worship; and what was at first the object of religious homage becomes that of superstitious confidence. Divine stones are transformed into amulets, which preserve the wearer from every ill, mental and corporeal. Although a distance of five hundred leagues separates the

banks of the Amazon and the Oroonoko from the Mexican table-land; although history records no fact, that connects the savage nations of Guyana with the civilized nations of Anahuac, the monk Bernard de Sahagun, at the beginning of the conquest, found *green stones* which had belonged to Quetzalcohuatl*, preserved at Cholula as relics. This mysterious personage is the Budha of the Mexicans; he appeared in the time of the Toltecks, founded the first religious congregations, and established a government similar to that of Meroë and of Japan.

The history of the jade, or of the green stones of Guyana, is intimately connected with that of the warlike women, whom the travellers of the sixteenth century named the Amazons of the New World. M. de la Condamine has produced many testimonies in favour of this tradition. Since my return from the Oroonoko and the river Amazons, I have often been asked at Paris, whether I embraced the opinion of that learned man, or believed, like several of his contemporaries, that he undertook the defence of the *Cougnantainsecouima*, the independant women who received men into their society only in the month of April, merely to captivate, in a public sitting of the Academy, the attention

* *Researches on the American Monuments*, vol. ii, (of the present work xiv,) p. 250.

of an audience somewhat eager for novelties. This is the place for me to express myself with frankness on a tradition, which has so romantic an appearance; and I am farther led to do this by M. de la Condamine's assertion, that the Amazons of the Rio Cayame* crossed the Ma-

* *Fray Pedro Simon*, p. 480. *La Condamine, Voyage à l'Amazone*, p. 101, 113, and 140. *Cayley's Life of Sir Walter Raleigh*, vol. i, p. 169. *Gili*, vol. i, p. 145—154. Orellana, arriving at the Maragnon by the Rio Coca and the Napo, fought with the Amazons, as it appears, between the mouth of the Rio Negro and that of the Xingu. M. de la Condamine asserts, that in the seventeenth century they passed the Maragnon between Tefe and the mouth of the Rio Puruz, near the Canno Cuchivara, which is a western branch of the Puruz. These women therefore came from the banks of the Rio Cayame, or Cayambe, consequently from the unknown country, which extends south of the Maragnon, between the Ucayale and the Madeira. Raleigh also places them on the south of the Maragnon, but in the province of Topayos, and on the river of the same name. He says they were "rich in golden vessels, which they had acquired in exchange for the famous green stones, or *piedras hijadas*. (Raleigh means, no doubt, *piedras del higado*, stones that cure diseases of the liver.) It is remarkable enough, that, one hundred and forty-eight years after, M. de la Condamine still found "a greater number of those green stones (*divine stones*), which differ neither in colour nor in hardness from oriental jade, among the Indians who inhabit near the mouth of the Rio Topayos, than any where else. The Indians said, that they inherited these stones, which cure the nephritic colic and epilepsy, from their fathers, who received them from the *women without husbands*." What has been related regards the Amazons

ragnon, to establish themselves on the Rio Negro. A taste for the marvellous, together with a wish to adorn the descriptions of the New Continent with some features drawn from classic antiquity, have no doubt contributed to give great importance to the first narratives of Orellana. In perusing the works of Vespucci, Ferdinand Columbus, Geraldini, Oviedo, and Pietro Martyr d'Anghieri, we recognize this tendency of the writers of the sixteenth century, to find among the newly discovered nations all that the Greeks have taught us of the first age of the world, and of the manners of the barbarous

south of the Maragnon; north of this river they are placed (according to different traditions collected in Cayenne, Grand Para, and at the Oroonoko), 1st. to the west of the great rapids of Oyapoc, beyond the Amicouan Indians (with long ears, Orejones, and Orellados); 2dly, west of the sources of the Rio Irijo or Arijo, which flows into the Amazon a little to the south of the Rio Araguary; 3dly, near the sources of the Cuchivero, which falls into the Oroonoko between Cabruta and Alta Gracia. The first two of these lead us nearly opposite to the region, in the valley of the Lower Maragnon, which was said to be inhabited by the Amazons. The resemblance between the names of the Cuchivaro (a tributary stream of the Maragnon, near which the Amazons passed the great river) and of the Cuchivero, (a tributary stream of the Oroonoko) according to father Gili, is not accidental. This missionary seems to think, that the Aikeambenano, who descended from the Amazons of the Maragnon, gave their new abode the denomination of the old. I doubt this fact, and the whole of this genealogy.

Scythians and Africans. Led by these travellers into another hemisphere, we fancy ourselves going over past times; for the hordes of America, in their primitive simplicity, display to Europe "a sort of antiquity, of which we are almost the contemporaries." What was then but an ornament of style, and a pleasure of the mind, is become in our days the subject of grave discussions. In a memoir published at Louisiana, the whole of Grecian fable is explained, without excluding the Amazons, by a knowledge of the localities of lake Nicaragua, and of some other American scenes!

If Oviedo, in addressing his letters to Cardinal Bembo, believed he ought to flatter the taste of a man so familiar with the study of antiquity, the navigator Sir Walter Raleigh had a less poetic aim*. He sought to fix the attention of Queen Elizabeth on the great *Empire of Guyana*, the conquest of which he proposed to her government. He gave the description of the rising of that *gilded king* (*el dorado*)†, whose chamberlains, furnished with long *sarbacans*, blew powdered gold every morning on his body, after having rubbed it over with aromatic oils:

* This is the opinion of Mr. Southey. (*History of Brazil*, vol. i, p. 608 and 653.) See also *Cayley's Life of Raleigh*, vol. i, p. 163, 198, and 226.

† The word dorado is not the name of a country; it signifies simply the *gilded*, *el rey dorado*.

but nothing could be better adapted to strike the imagination of queen Elizabeth, than the warlike republic of women without husbands, who resisted the Castilian heroes. I point out the motives, which led those writers, who have given most reputation to the Amazons of America to exaggerate: but these motives do not, I think, suffice for rejecting a tradition entirely, which is spread among various nations, who have no communications with each other.

The testimonies collected by M. de la Condamine are very remarkable; he has published them in detail, and I have a pleasure in adding, that, if this traveller has passed in France and England for a man whose curiosity was the most constantly awake, he is considered in Quito, in the country he described, as the traveller who has adhered the most stedfastly to truth. Thirty years after M. de la Condamine, a Portugueze astronomer, Mr. Ribeiro, who has traversed the Amazon, and the tributary streams which run into that river on the northern side, has confirmed on the spot all that the learned Frenchman had advanced. He found the same traditions among the Indians; and he collected them with so much the greater impartiality, as he did not himself believe, that the Amazons formed a separate horde. Not knowing any of the tongues spoken on the Oroonoko and the Rio Negro, I could learn nothing certain on

the popular traditions of *women without husbands,* and on the origin of the *green stones,* which are believed to be intimately connected with them. I shall however recite a modern testimony of some weight, that of father Gili. "Upon inquiring," says this well-informed missionary, "of a Quaqua Indian, what nations inhabited the Rio Cuchivero, he named to me the Achirigotoes, the Pajuroes, and the Aikeambenanoes*. Well acquainted with the Tamanac tongue, I instantly comprehended the sense of this last word, which is a compound, and signifies *women living alone.* The Indian confirmed my observation, and related, that the Aikeambenanoes were a community of women, who fabricated long *sarbacans,* and other weapons of war. They admit once a year the men of the neighbouring nation of Vokearoes into their society, and send them back with presents of sarbacans. All the male children born in this horde of women are killed in their infancy." This history seems framed on the traditions, which circulate among the Indians of the Maragnon, and among the Caribbees; yet the Quaqua Indian, of whom father Gili speaks, was ignorant of the Castilian language; he had never had any communication with white men; and certainly knew not, that south of the Oroo-

* In Italian, *Acchirecotti, Pajuri,* and *Aicheam-benano.*

noko there existed another river, called the river of the Aikeam-benanoes, or the Amazons.

What must we conclude from this narration of the ancient missionary of Encaramada? not that there are Amazons on the banks of the Cuchivero, but that women, in different parts of America, wearied of the state of slavery in which they were held by the men, united themselves together, like the fugitive negroes, in a *palenque* [staccado]; that the desire of preserving their independance rendered them warriors; and that they received visits from a neighbouring and friendly horde, perhaps a little less methodically than tradition relates. It is sufficient, that this society of women acquired some power in one part of Guyana, for events the most simple, which may have been repeated in different places, to have been described in a uniform and exaggerated manner. This is the character of traditions; and if the most extraordinary rising of the slaves, of which I have spoken above*, had taken place in the middle of the continent, instead of having happened near the coast of Venezuela, a credulous people would have seen in every *palenque* of Maroon Negroes the court of king Miguel, his council of state, and the Negro bishop of Buria. The Caribbees of the continent held intercourse with those of the

* Vol. iv, p. 252.

islands, and no doubt in this way the traditions of the Maragnon and the Oroonoko were propagated toward the north. Before the voyage of Orellana, Christopher Columbus thought he had already found the Amazons in the Caribbee islands. This great man was told, that the small island of Madanino (Montserrat) was inhabited by warlike women, who lived the greater part of the year separate from men*. At other times also, the *conquistadores* imagined, that the women, who defended their huts† in the absence of their husbands, were republics of Amazons; and, what was an error less excusable, made a like supposition respecting the religious congregations, the convents ‡ of Mexican virgins, who, far from admiting men at any season of the year into their society, lived according to the austere rule of Quetzalcohuatl. Such was the disposition of men's minds, that in the long succession of travellers, who crowded on each other in their discoveries, and in narrations of the marvels of the New World, every one chose to have seen, what his predecessors had announced.

We passed three nights at San Carlos del Rio

* *Petr. Martyr*, p. 17. Hackluyt's Collect. (Lond. 1812), p. 384. *Gryæus*, p. 69.

† *Fray Pedro Simon, Not.* 6, *cap.* 26.

‡ One of these convents was near Cozumel, on an island. (Grynæus, p. 500.)

Negro. I count the nights, because I watched during the greater part of them, in the hope of seizing the moment of the passage of some star over the meridian. That I might have nothing to reproach myself with, I kept the instruments always ready for an observation. I could not even obtain double altitudes, to calculate the latitude by the method of Douwes. What a contrast between two parts of the same zone; between the sky of Cumana, where the air is constantly pure, as in Persia and Arabia, and the sky of the Rio Negro, veiled like that of the Feroe islands, without Sun, or Moon, or stars! I felt so much the more pain in leaving the fort of San Carlos, as I could not then hope to obtain near that spot a good observation for the latitude*. I found the dip of the magnetic needle 22·6° cent. div. The magnetic force was expressed by two hundred and sixteen oscillations in ten minutes of time. As the magnetic parallels rise to the westward, and as I found on the back of the Cordilleras, between Santa Fe de Bogota and Popayan, the same dips observed

* Five altitudes of the Sun, taken the 8th of May, (all that I could obtain,) gave me, according to the time-keeper, 69° 58′ 39″, for the longitude of San Carlos. The error therefore of the map of La Cruz, and of those by whom it has been copied, was nearly two degrees. All that part of America was carried too far toward the east. (See my *Observ. Astr.*, vol. 1, p. 238.)

on the Upper Oroonoko and the Rio Negro, these observations are of great importance for the theory of *lines of equal intensity*, or *isodynamic lines**. The number of oscillations is the same at Javita and at Quito, and yet the magnetic dip is 26·4° at the former of these places; and at the latter, 14·85°. The force under the magnetic equator (at Peru) being expressed by unity, we find the intensity of force at Cumana = 1·1779; at Carichana = 1·1575; at Javita 1·0675; at San Carlos = 1·0480. Such is the decrement of the force from north to south in eight degrees of latitude, between sixty-six degrees and a half and sixty-nine degrees of longitude west of Paris. I mention expressly the difference of the meridians; for in submitting my *isodynamic observations*† to new researches, a geometrician deeply versed in the study of terrestrial magnetism, Mr. Hansteen, discovered, that the intensity of the force varies in the same magnetic parallel according to fixed laws, and that the knowledge of these laws causes a great part of the anomalies to disappear, which this phenomenon seemed to offer. It is in general certain, as I have concluded from the whole of my observations, that the intensity of force aug-

* See the great work of Mr. Hansteen, which has appeared in Norway, under the title of *Ueber der Magnetismus der Erde*, 1819, p. 14, and 66—77.

† Journal de Physique, vol. lix, p. 287.

ments from the magnetic equator to the pole *; but the rapidity of this increase appears to vary under different meridians. When two places have the same dip, the force is greatest to the west of the meridian which traverses the centre of South America; and diminishes on the same parallel at the east toward Europe. In the southern hemisphere it seems to attain it's minimum on the eastern coast of Africa; and then augments anew, on the same magnetic parallel, as far as toward New Holland. I found the intensity of the force at Mexico almost as great as at Paris, yet the difference of the dip is more than thirty-one degrees cent†. My needle, which oscillated beneath the magnetic equator (in Peru) two hundred and eleven times, would not have oscillated under the same equator, in the meridian of the Philippine Islands, at the utmost only two hundred and two or two hundred and three times. This striking difference results from the comparison of my observations of intensity made at Santa Cruz in Teneriff with those collected there by Mr. de Rossel‡ seven years before.

* From the point where the magnetic equator crosses Peru as far as Paris, 1 : : 1·3703. (*Obs. Astr.*, vol. i, p. lxxv. *Mémoires d'Arcueil*, vol. 1, p. 21.)

† Mexico (in lat. 19° 25′ 45″, long. 101° 25′ 30″). Dip 46·85°. Intensity of force, 242. *Paris* (in lat. 48° 50′ 15″, long. 0°0). Dip in 1798, 77·62°. Intensity, 245.

‡ My needle oscillated at Teneriff two hundred and thirty-

The magnetic observations made on the banks of the Rio Negro are, of all those we know in the interior of a great continent, the nearest to the magnetic equator. They have consequently served to determine* the position of this equator, which I crossed more to the west on the ridge of the Andes, between Micuipampa and Caxamarca, in the seventh degree of south latitude. The magnetic parallel of San Carlos (that of 22·6° cent.) passes through Popayan, and in the South Sea through a point (at 3° 12′ north lat., and 89° 36′ west long.), where I was fortunate enough to have an opportunity of making observations in very calm weather†.

eight times; that of Mr. de Rossel, two hundred and eighty-eight times. The first therefore would have made two hundred and forty-five oscillations at Brest, reducing it to the observations of Mr. de Rossel. This is exactly the number, which it gave at Paris, and this number confirms the exactness of the comparison. (*Hansteen*, p. 70 and 72.)

* Mr. Hansteen finds, according to my observations, the magnetic equator in the longitude of San Carlos del Rio Negro (69° 58′ west of Paris) in the latitude of nine degrees and a half south. Mr. Orlet, in a valuable paper presented lately to the Academy of Sciences, makes the line of no dip pass through 7° 44′ of south latitude. M. Biot gives San Carlos 10° 13′ 14′ of magnetic latitude.

† Popayan (lat. 2° 26′ 17″ north; long. 78° 59′). Dip 23·05° cent. South Sea (the spot mentioned in the text). Dip. 22·8° cent. But the *isodynamic* parallel of San Carlos, that is to say, the line of equal intensity, passes to the south of these two places.

May the 10th. Our canoe had received it's lading during the night; and we embarked a little before sunrise, to go up the Rio Negro as far as the mouth of the Cassiquiare, and to devote ourselves to researches on the real course of this river, which unites the Oroonoko to the Amazon. The morning was fine; but, in proportion as the heat augmented, the sky became obscured. The air is so saturated by water in these forests, that the vesicular vapours become visible on the least increase of evaporation at the surface of the Earth. The breeze being never felt, the humid strata are not displaced and renewed by dryer air. We were every day more grieved at the aspect of the cloudy sky. M. Bonpland was losing by this excess of dampness the plants he had collected: and I for my part was afraid, that I should again find the fogs of the Rio Negro in the valley of the Cassiquiare. No one in these missions for half a century past had doubted of the communication, which exists between two great systems of rivers; the important point of our voyage was confined therefore to fixing by astronomical observations the course of the Cassiquiare, and particularly the point of it's entrance into the Rio Negro, and that of the bifurcation of the Oroonoko. Without a sight of the Sun and the stars this object would be frustrated, and we should have exposed ourselves in vain to long

and painful privations. Our fellow travellers would have returned by the shortest way, that of the Pimichin, and the small rivers; but M. Bonpland preferred like me persisting in the plan of the voyage, which we had traced for ourselves in passing the Great Cataracts. We had already travelled one hundred and eighty leagues in a boat from San Fernando de Apure, to San Carlos (on the Rio Apure, the Oroonoko, the Atabapo, the Temi, the Tuamini, and the Rio Negro). In again entering the Oroonoko by the Cassiquiare we had to navigate three hundred and twenty leagues, from San Carlos to Angostura. By this way we had to struggle against the currents during ten days; the rest was to be performed by going down the stream of the Oroonoko. It would have been blamable to have suffered ourselves to be discouraged by the fear of a cloudy sky, and by the *moschettoes* of the Cassiquiare. Our Indian pilot, who had been recently at Mandavaca, promised us the Sun, and "those great stars that *eat* the clouds," as soon as we should have left the *black waters* of the Guaviare. We therefore executed our first project of returning to San Fernando de Atabapo by the Cassiquiare, and, fortunately for our researches, the prediction of the Indian was verified. The *white waters* brought us by degrees a more serene sky, stars, moschettoes, and crocodiles.

We passed between the islands of Zaruma and Mini, or Mibita, covered with thick vegetation; and, after having ascended the rapids of the *Piedra de Uinumane*, we entered the Rio Cassiquiare at the distance of eight miles from the small fort of San Carlos. The *Piedra*, or granitic rock which forms the little cataract, attracted our attention by the number of veins of quartz by which it is traversed. These veins were several inches broad, and their masses proved, that their date and formation were very different. I saw distinctly, that, wherever they crossed each other, the veins containing mica and black schorl *traversed* and *drove out of their direction* those, which contained only white quartz and feldspar. According to the theory of Werner, the black veins were consequently of a more recent formation than the white. Being a disciple of the school of Freiberg, I could not but pause with satisfaction at the rock of Uinumane, to observe the same phenomena near the equator, which I had so often seen in the mountains of my own country. I confess, that the theory, which considers the veins as clefts filled *from above* with various substances, pleases me somewhat less now, than it did at that period; but these modes of intersection and *driving aside*, observed in the stony and metallic veins, do not the less merit the attention of travellers, as being one of the most general and constant of

geological phenomena. On the east of Javita, all along the Cassiquiare, and particularly in the mountains of Duida, the number of veins in the granite increases. These veins are full of holes and *druses*, and their frequency seems to indicate, that the granite of these countries is not of very ancient formation.

We found some lichens on the rock Uinumane, opposite the island of Chamanare, at the edge of the rapids; and as the Cassiquiare near it's mouth turns abruptly from east to south-west, we saw for the first time this majestic branch of the Oroonoko in all it's breadth. It much resembles the Rio Negro in the general aspect of the landscape. The trees of the forest, as in the basin of the latter river, advance as far as the beach, and there form a thick copse; but the Cassiquiare has white waters, and more frequently changes it's direction. It's breadth near the rapids of Uinumane almost surpasses that of the Rio Negro. I found it every where from two hundred and fifty to two hundred and eighty toises, as far as above Vasiva. Before we passed the island of Garigave, we perceived to the north-east, almost at the horizon, a little hill with a hemispheric summit; the form which in every zone characterises the mountains of granite. Continually surrounded by vast plains, the solitary rocks and hills excite the attention of the traveller. Contiguous mountains are only

found more to the east, toward the sources of the Pacimoni, Siapa, and Mavaca. Having arrived on the south of the Raudal of Caravine, we perceived that the Cassiquiare, by the windings of it's course, again approached San Carlos. The distance from this fort to the mission of San Francisco Solano, where we slept, is only two leagues and a half, by land; but it is reckoned seven or eight by the river. I passed a part of the night in the open air, waiting vainly for stars. The air was misty, notwithstanding the *aquas blancas*, which were to lead us beneath an ever-starry sky.

The mission of San Francisco Solano, situate on the left bank of the Cassiquiare, was thus named in honor of one of the chiefs of the *expedition of the boundaries*, Don Joseph Solano, of whom we have often had occasion to speak in this work. This well-informed officer never went beyond the village of San Fernando de Atabapo; he saw neither the waters of the Rio Negro and the Cassiquiare, nor those of the Oroonoko east of the mouth of the Guaviare. It is by an error founded on ignorance of the Spanish language, that geographers have fancied they saw in the celebrated map of La Cruz Olmedilla the traces of a road four hundred leagues long, by which it is pretended that Don Joseph Solano reached the sources of the Oroonoko, lake Parime, or the *White sea*, and the

banks of the Cababury and the Uteta! The mission of San Francisco was founded, as were most of the Christian settlements south of the Great Cataracts of the Oroonoko, not by monks, but by military authority. At the time of the *expedition of the boundaries*, villages were built in proportion as a *subteniente*, or a corporal, advanced with his troop. Part of the natives, in order to preserve their independence, retired without a struggle; others, of whom the most powerful chiefs* had been gained, joined the missions. Where there was no church, they contented themselves with erecting a great cross of red wood, at the side of which they constructed a *casa fuerte*, that is, a house, the walls of which were formed of large beams, resting horizontally upon each other. This house had two stories; in the upper story two cannons of small calibre were placed; and two soldiers lived on the ground-floor, and were served by an Indian family. Those of the natives with whom they were at peace cultivated spots of land round the *casa fuerte*. The soldiers called them together by the sound of the horn, or a *botuto* of baked earth, whenever any hostile attack was dreaded. Such were the pretended nineteen Christian settlements founded by Don Antonio Santos in the way from

* On the Cassiquiare these were captain Mara, chief of the Maisanas, and Imù, chief of a branch of the Marepizanas.

Esmeralda to the Erevato. Military posts, which had no influence on the civilization of the natives, figured on the maps, and in the works of the missionaries, as villages (*pueblos*) and *reducciones apostolicas**. The preponderance of the military was maintained on the banks of the Oroonoko till 1785, when the system of the monks of Saint Francis began. The small number of missions founded, or rather reestablished, since that period, are owing to the fathers of the Observance; for the soldiers now distributed among the missions are dependant on the missionaries, or at least are reputed to be so, according to the pretensions of the ecclesiastical hierarchy.

The Indians whom we found at San Francisco Solano were of two nations; Pacimonales, and Cheruvichahenas. The latter being descended from a considerable tribe settled on the Rio Tomo, near the Manivas of the Upper Guainia, I tried to gather from them some ideas of the upper course and the sources of the Rio Negro; but the interpreter, whom I employed, could not make them comprehend the sense of my questions. They only repeated to satiety, that the sources of the Rio Negro and the Inirida were as near to each other, as "two fingers of the

* See the *Corografia del Padre Caulin*, p. 77; and the *Map of the Missions of the Oroonoko, by Surville*, 1778.

hand." In one of the huts of the Pacimonales we made the acquisition of two large fine birds, a toucan (*piapoco*)*, approaching the ramphastos erythrorhynchos, and an *ana*, a species of macaw, seventeen inches long, having the whole body of a purple colour, like the p. macao. We had already in our canoe seven parrots, two manakins (pipra), a motmot, two *guans*, or *pavas de monte*, two manaviris (cercoleptes or viverra caudivolvula), and eight monkeys, namely, two ateles†, two titis‡, one viudita‖, two douroucoulis or nocturnal monkeys§, and the cacajao with a short tail¶. Father Zea whispered some complaints at the daily augmentation of this ambulatory collection. The toucan resembles the raven in it's manners and intelligence. It is a courageous animal, but easily tamed. It's long and stout beak serves to defend it at a distance. It makes itself master of the house, steals whatever it can come at, and loves to bathe often

* *Kiapoco*, or *aviapoco*.

† *Marimonda* of the Great Cataracts, simia belzebuth, Brisson.

‡ Simia sciurea, the saimiri of Buffon. (See my *Rec. d' Observ. de Zoologie*, vol. i, p. 327, 334, 353, and 357.)

‖ Simia lugens. (Ib., p. 319).

§ Cusicusi or simia trivirgata. (Ib. p. 307 and 358.) This is the aotus of Illiger.

¶ Simia melanocephala, *mono feo*. (Ib. p. 317.) These last three species are new.

and fish on the banks of the river. The toucan we had bought was very young; yet it took delight, during the whole voyage, in teazing the cusicusis, or nocturnal monkeys, which are sad and passionate. I did not observe what has been related in some works of natural history, that the toucan is forced, from the structure of it's beak, to swallow it's food by throwing it up into the air. It raises it indeed with some difficulty from the ground, but, having once seized it with the point of it's enormous beak, it has only to lift it up by throwing back it's head, and hold it perpendicularly as long as it is in the act of swallowing. This bird makes extraordinary gestures when preparing to drink. The monks say, that it makes the sign of the cross upon the water; and this popular belief has obtained for the toucan, from the creoles, the singular name of *diostede* (God grant it thee).

Most of our animals were confined in small willow cages; others ran at full liberty all over the boat. At the approach of rain, the macaws sent forth frightful cries, the toucan wanted to gain the shore to fish, and the little monkeys, the titis, went in search of father Zea, to take shelter in the large sleeves of his Franciscan habit. These scenes were often repeated, and made us forget the torment of the *moschettoes*. At night, when we rested, we placed a leather

case (*petaca*), containing our provision, in the centre; then our instruments, and the cages of the animals; our hammocks were suspended around these; and beyond, were those of the Indians. The exterior circle was formed by the fires, which are lighted to keep off the jaguars of the forest. Such was the order of our encampment on the banks of the Cassiquiare. The Indians often spoke to us of a little nocturnal animal, with a long nose, that surprises the young parrots in their nests, and makes use of it's hands to eat, like the monkeys, and the maniveris, or kinkajous. They call it *guachi*; it is, no doubt, a coati, perhaps the viverra nasua, which I saw wild in Mexico, but not in that part of South America which I visited. The missionaries gravely prohibit the natives from eating the flesh of the *guachi*, to which, according to far-spread superstitious ideas, they attribute the same stimulating qualities, which the people of the east seek in the skink*, and the Americans in the flesh of the alligators.

May the 11th. We left the mission of San Francisco Solano at a late hour, to make but a short day's journey. The uniform stratum of vapours began to be divided into clouds with distinct outlines; and there was a light east wind in the upper regions of the air. We re-

* *Lacerta scincus*, L.

cognized in these signs an approaching change of the weather; and were unwilling to go far from the mouth of the Cassiquiare, in the hope of observing during the following night the passage of some star over the meridian. We discovered the *Canno* Daquiapo to the south, the Guachaparu to the north, and a few miles farther the rapids of Cananivacari. The velocity of the current being 6·3 feet in a second, we had to struggle against the turbulent waves of the *Raudal*. We went on shore, and M. Bonpland discovered within a few steps of the beach an *almendron**, or majestic bertholletia excelsa. The Indians assured us, that the existence of this valuable plant of the banks of the Cassiquiare was unknown at San Francisco Solano, Vasiva, and Esmeralda. They did not think, that this tree, which was more than sixty feet high, had been sown accidentally by some traveller. Experiments made at San Carlos have shown how rare it is, to succeed in causing the bertholletia to germinate, on account of it's ligneous pericarp, and the oil contained in it's nut, which so easily becomes rancid. Perhaps this tree denoted the existence of a forest of bertholletia in the inland country on the east and northeast. We know at least with certainty, that this fine tree grows wild in the latitude of three

* Juvia.

degrees, in the Cerros de Guanaya. The plants that live in society have seldom marked limits, and it happens, that, before we reach a *palmar* or a *pinal**, we find solitary palm-trees and pines. They are somewhat like colonists, that have advanced in the midst of a country peopled with different vegetable productions.

Four miles distant from the rapids of Cunanivacari rocks of the strangest form rise in the plains. First appears a narrow wall eighty feet high, and perpendicular; and at the southern extremity of this wall are two turrets, the courses of which are of granite, and nearly horizontal. The arrangement of the rocks of Guanari is so symmetrical, that they might be taken for the ruins of an ancient edifice. Are they the remains of islets in the midst of an inland sea, that covered the flat ground between Sierra Parime and Mount Parecis†? or have these walls of rock, these turrets of granite, been

* Two words of the Castilian tongue, which, according to a Latin form, denote forests of palm-trees (*palmetum*) and of pines (*pinetum*).

† Sierra de la Parime, or of the Upper Oroonoko; Sierra (or Campos) dos Parecis, making part of the mountains of Matto Grosso, and forming the northern back of the Sierra de Chiquitos. I here name the two chains of mountains running from east to west, that border the plains or basins of the Cassiquiare, the Rio Negro, and the Amazon, between 3° 30′ of north, and 14° of south latitude.

heaved up by the elastic forces, that still act in the interior of our planet? We may be permitted to meditate a little on the origin of mountains, after having seen* the disposition of the Mexican volcanoes, and of the summits of vent-holes on an elongated crevice; having found in the Andes of South America primitive and volcanic rocks in a straight line in the same chain; and when we recollect that island, three miles in circumference, and of a great height, which in our days issued from the depths of the ocean near Oonalashka.

The banks of the Cassiquiare are embellished by the *chiriva* palm tree with pinnate leaves silvery beneath. The rest of the forest furnishes only trees with large, coriaceous, glossy leaves, that have plain edges. This peculiar physiognomy† of the vegetation of the Guainia, the Tuamini, and the Cassiquiare, is owing to

* See vol. iv, p. 38, and my Polit. Essay on New Spain, vol. i, p. 45, 253. *Langsdorf's Travels*, vol. 2, p. 30, 242, and particularly the new facts published by Mr. Leopold von Buch, in two celebrated memoirs *Sur les Cratères de Soulèvement*, and the astonishing revolutions, which the island of Lancerota underwent from 1730 to 1736. The Russians call the new island, near Oonalashka, Gromofsin, the *Child of Thunder*.

† This physiognomy struck us forcibly in the vast forest of Spanish Guyana only between the latitudes of two and three degrees north.

the preponderance of the families of the guttiferæ, the sapotæ, and the laurineæ, in the equatorial regions. The serenity of the sky promising us a fine night, we resolved at five in the evening to rest near the *Piedra di Culimacari*, a solitary granitic rock, like all those which I have described between the Atabapo and the Cassiquiare. We found by the bearings of the sinuosities of the river, that this rock is nearly in the latitude of the mission of San Francisco Solano. In those desert countries, where man has hitherto left only fugitive traces of his existence, I constantly endeavoured to make my observations near the mouth of a river, or at the foot of a rock distinguishable by it's figure. It is such points only, immutable by their nature, that can serve for the basis of geographical maps. I obtained in the night of the 10th of May a good observation * of latitude by α of the Southern Cross; the longitude was determined, but with less precision, by the time-keeper, taking the altitudes of the two beautiful stars which shine in the feet of the Centaur.

* All the partial altitudes differ but from six to ten seconds from the mean latitude. See my *Obs. Astr.*, vol. i, p. 239. A defect in the figures in my journal would have rendered the longitude uncertain to forty-four seconds of time, or nearly one sixth of a degree; but the horary angles taken at San Carlos being exact to three or four seconds nearly, we have reduced the longitude of Culimacari from that of the little fort of S. Carlos.

This observation made known to us at the same time, with sufficient precision for the purposes of geography, the positions of the mouth of the Pacimoni, of the fortress of San Carlos, and of the junction of the Cassiquiare with the Rio Negro. The rock of Culimacari is precisely in 2° 0′ 42″ of latitude, and probably in 69° 33′ 50″ of longitude. I stated in two memoirs written in Spanish, and addressed, one to the captain general of Caraccas, the other to the minister, secretary of state, Mr. d'Urquijo, all that was interesting in these astronomical determinations relatively to the knowledge of the limits of the Portugueze colonies. At the time of the expedition of Solano, the junction of the Cassiquiare and the Rio Negro was placed half a degree north of the equator* ; and although the commission of boundaries never obtained a definitive result, the equator has always been regarded in the missions as a limit provisionally recognized. Now it results from my observations, that San Carlos del Rio Negro†, or, as

* The real latitude of this junction appears to me to differ little from 2° 2′. It's longitude is 70° 0′.

† Mr. Faden also, in his map of South America, placed S. Carlos in lat. 0° 54′; and Mr. Arrowsmith, not in the edition of 1811, but in the first edition of 1804, made the equator pass (like La Cruz), one degree too far to the north, through the mouth of the Uteta, or Xiè. We must not be surprised, that the maps of Brazil, constructed recently at the Hydrographic Depot of Rio Janeiro, mark San Carlos nearly

they say pompously here, the fortress of the frontier, far from being, as father Caulin affirms, in 0° 20′ of latitude, or in 0° 53′, where La Cruz and Surville, (who are the official geographers of the *real Expedicion de Limites*) have thought proper to fix it, is in 1° 53′ 42″. The equator therefore does not pass to the north of the little Portugueze fort of San Jose da Marabitannas, as it has been marked* in all the maps

in it's real position. It is expressly said in an advertisement added to the map of the Rio Negro by Jose Joaquim Victorio da Costa, Jose Simoens de Carvalho, and Manoel de Gama Lobo, that whatever relates to Spanish Guyana is taken from the map of the *Voyage de Depons*, which was traced by Mr. Poirson, from my observations made on the spot. (See my *Obs. Astr.*, vol. i, p. 238.) The Portugueze had the habit, as I have said above (p. 364, 5) of extending their frontiers toward the north; and perhaps observations, made at the forts of San Gabriel das Cachoeiras and San Jose da Maribitanuas, had enlightened the Portugueze astronomers, before my voyage, respecting the real situation of San Carlos. In the map of Requena, traced in 1783, and founded on Portugueze materials, it is marked two degrees seventeen minutes. It is even twenty-four minutes in fault, toward the north. The two hundred and thirty-five points, of which I fixed the astronomical situation by my own observations in the inland country, were calculated and published for the first time by Mr. Oltmans in 1808 (consequently a year before the publication of my *Recueil d'Observations Astronomiques*), in a memoir entitled *Conspectus Long. et Lat. per Decursum Annorum* 1799—1804, *in Plaga equinoctiale astronomice observatarum.*

* Did d'Anville alone *guess*, in 1750, that the equator

hitherto, except in the new edition of that of Mr. Arrowsmith, but twenty-five leagues farther south, between San Felipe and the mouth of the Rio Guape. The manuscript map of Mr. Requena, of which I am in possession, proves, that the Portugueze astronomers had been aware of this fact from the year 1783, consequently thirty-five years before it began to be indicated on our maps in Europe.

It being an opinion anciently received in the Capitania-General of Caraccas, that the able engineer, Don Gabriel Clavero, had constructed the fort of San Carlos del Rio Negro on the equinoctial line itself; and as the latitudes observed near this line were, according to M. de La Condamine*, in fault by an excess toward

passes through the confluence of the Rio Uaupe? That geographer has in fact marked it near a river, to which he gives the strange name of the *Rio Cachiquiari de Baupes;* but he places the mouth of the real Cassiquiare in 1° 20′ of south latitude, consequently three degrees twenty-two minutes too far to the south. Such must be the effects of this kind of guess work, unsupported by any astronomical observation for a hundred leagues round.

* "I was assured," says M. de la Condamine, "on arriving at Parà, that I was precisely under the line; yet I found the latitude one degree twenty-eight minutes south. This latitude of a place, where no observation had been made, is found marked by Laet, but no subsequent geographer had followed this indication." (*Voyage à l'Amazone*, p. 179.) Father Samuel Fritz, furnished with a semicircle of wood,

the south; I was prepared to find the equator one degree north of San Carlos, consequently on the banks of the Temi and the Tuamini. The observations made at the mission of San Baltasar (the passage of three stars over the meridian) had already led me to perceive, that this hypothesis was erroneous; but it was only by the latitude of Piedra Culimacari, that I learnt to know the real situation of the frontiers. The isle of San Jose, in the Rio Negro, considered up to this day as the limit between the Spanish and Portugueze possessions, is at least, in 1° 38′ north latitude; and if the commission of Iturriaga and Solano had attained the object of it's long negotiations, if the equator had been definitively recognized by the court of Lisbon as the frontier of the two states, six Portugueze villages, and even the fort of San Jose, lying on the north of the Rio Guape, would now belong to the crown of Spain*. What it would then have acquired, thanks to some precise astronomical observations, is more impor-

of three inches radius, had pretty well ascertained the latitude of Para, although he places in general the river Amazon, where it extends to the east of the mouth of the Rio Negro, too far to the south. (*Lettres édifiantes, ed. of* 1717, vol. 12, p. 212.)

* The missions of San Miguel, Santa Ana, San Felipe, Nosso Senhora de Guia, San Joam Baptista de Mabbe, San Marcellino, and the fort of San Jose da Marabitanuas.

tant, than what it possesses at present; but let us hope, that two nations, who have sown the first seeds of civilization over the immense extent of South America east of the Andes, will not renew the quarrels concerning boundaries on a portion of land 32 leagues broad, and on the possession of a river, of which the navigation should be as free as that of the Oroonoko and the Amazon *.

* I unfolded these ideas in a memoir, which I addressed to the chevalier don Mariano Luis de Urquijo, in 1800. Although the count at that time possessed unlimited power, I was permitted to declare my opinions with frankness to a minister, who was constantly animated by the noble desire of knowing the real state of the colonies. The following reflexions are placed at the conclusion of my memoir on the limits. " Parece que un Monarca que tiene tam dilatadas y vastas colonias, no necesita aumentarlas con un corto terreno en las margenes del Rio Negro; però es preciso considerar que lo que se ha perdido, vale mas que las quatro missiones de Tomo, Maroa, Davipe y San Carlos. Seria util tambien que se atendiese a sostener los limites al Este, porque al presente los Indios de las missiones Portuguesas (sin ser vistòs de la fortaleza de San Carlos), suben por los rios Cababury, Baria, Pacimoni y Idapa hasta Mavaca y la Esmeralda, mas de 60 leguas detras de los establecimientos Españoles, buscando en el territorio Español la preciosa Zarza que es un ramo de comercio del Grand Parà. Aunque no hai probalidad que, por las circumstancias politicas actuales, V. E. pueda atender a estos assuntos, parece siempre util que el gobierno estè puntualmente instruido sobre la verdadera situacion de sus limites. Lo que seria lo mas digno de ser obtenido baxo el reynado del Rey Carlos IV, por el medio de

May the 12th. Satisfied with our observations, we left the rock of Culimacari at half after one in the morning. The torment of *moschettoes*, to which we were exposed, augmented in proportion as we increased our distance from the Rio Negro. There are no *zancudoes* (culex) in the valley of Cassiquiare, but the simulium, and all the other insects of the tipulary family, are only so much more frequent and venomous*. Having still eight nights to pass in the open air in this damp and unhealthy climate, before we could reach the mission of Esmeralda, our pilot sought to arrange our voyage in such a manner, as might enable us to enjoy the hospitality of the missionary of Mandavaca, and some shelter in the village of Vasiva. We went up with difficulty against the current, which was nine feet, and in some places (where I measured it with precision) 11 feet 8 inches in a second, that is almost eight miles an hour. Our resting-place was probably not farther than three leagues in a

mutuas concesiones, seria una libertad entera y reciproca de comercio en estos magestuosos rios, el Orinoco, el Cassiquiare, el Rio Negro y el Marañon. Nada seria mas propio para fomentar la prosperidad de unos payses tam atrasados en el cultivo de las tierras, para sosegar el ardor con el qual los Americanos piden el exercicio de sus derechos naturales y para disminuir la antipatia que existe desgraciadamente entre dos naciones limitaneas."

* See above, p. 91.

right line from the mission of Mandavaca; yet, though we had no reason to complain of the want of activity of our rowers, we were 14 hours in making this short passage.

Towards sunrise we passed the mouth of the Rio Pacimoni, a river which has been mentioned above* when speaking of the trade in sarsaparilla, and which furnishes (by means of the Baria) so remarkable an intertwining with the Cababuri. The Pacimoni rises in a hilly ground, from the confluence of three small rivers †, not marked on the maps of the missionaries. It's waters are black, but in a less degree than those of the lake of Vasiva, which also communicates with the Cassiquiare. Between those two tributary streams coming from the east lies the mouth of the Rio Idapa, the waters of which are white. I shall not recur again to the difficulty of explaining this coexistence of rivers differently coloured within a small space of ground; and shall only observe, that at the mouth of the Pacimoni, and on the borders of the lake Vasiva, we were again struck with the purity and extreme transparency of the brown waters. Ancient Arabian travellers have observed, that the Alpine branch of the Nile, which joins the Bahar el Abiad near Kalfaja, has green waters, which

*. Chapter xxiii, p. 376.

† The Rios Guajavaca, Moreje, and Cachevaynery.

are so transparent, that the fish may be seen at the bottom of the river *.

We passed some turbulent rapids before we reached the mission of Mandavaca. The village, which bears also the name of Quirabuena, contains only sixty natives. The state of the Christian settlements is in general so miserable, that, in the whole course of the Cassiquiare, on a length of 50 leagues, not 200 inhabitants are found. The banks of this river were indeed more peopled before the arrival of the missionaries; the Indians have withdrawn into the woods, toward the east; for the plains of the

* *Et. Quatremere, Mém. sur l'Egypte,* vol. ii, p. 7; *Burckhardt,* Tr. p. 498. It is very remarkable, that the *Blue Nile (Bahar el Azrek)* is called by some Arabian geographers the *Green Nile,* and that the Persian poets often term the sky *green (akhzar),* as the berylblue *(zark).* It cannot be supposed, that the people of Semitic race confound green and blue in their sensations, as their ear sometimes confounds the vowels *o* and *u*, *e* and *a*. The word *azrek* is applied to all water which is very limpid, and not milky; and *abi-rank,* (colour of water) signifies blue. Abd-Allatif, speaking of that green and transparent branch of the Nile, which comes from a lake in the mountains south-east of Sennaar, attributed the green colour of this Alpine lake "to the vegetable substances, which abound in stagnant waters." *Account of Egypt,* translated by M. Silvestre de Sacy, p. 337. This is the explanation which I gave above (p. 191) of those coloured waters, falsely called *aguas negras.* The most limpid and transparent waters are every where those that are not white.

west are almost deserted. The natives subsist during a part of the year on those large ants, of which I have spoken above. These insects are as much esteemed here, as the spiders of the tribe of epeïræ in the southern hemisphere, where the savages of New Holland deem them delicious. We found at Mandavaca the good old missionary, who had already spent "twenty years of moschettoes in the *bosques del Cassiquiare*," and whose legs were so spotted by the stings of insects, that the whiteness of the skin could scarcely be perceived. He talked to us of his solitude, and of the sad necessity, which often compelled him to leave the most atrocious crimes unpunished in the two missions of Mandavaca and Vasiva. In the latter place, an Indian alcayde had a few years before eaten one of his wives, after having taken her to his *conuco* *, and fattened her by good feeding. The cannibalism of the nations of Guyana is never caused by the want of subsistence, or by the superstitions of their religion, as in the islands of the South Sea; but is generally the effect of the vengeance of a conqueror, and (as the missionaries say,) "of a vitiated appetite." Victory over a hostile horde is celebrated by a repast, in

* A hut surrounded with cultivated ground, a sort of country-house, which the natives prefer to residing in the missions.

which some parts of the body of a prisoner are devoured. Sometimes a defenceless family is surprised in the night; or an enemy, who is met with by chance in the woods, is killed by a poisoned arrow. The body is cut to pieces, and carried as a trophy to the hut. It is civilization only, that has made man feel the unity of the human race; which has revealed to him, as we may say, the ties of consanguinity, by which he is linked to beings, to whose language and manners he is a stranger. Savages know only their own family; and a tribe appears to them but a more numerous assemblage of relations. When those who inhabit the missions see Indians of the forest, who are unknown to them, arrive, they make use of an expression, which has struck us by it's simple candor: "they are no doubt my relations, I understand them when they speak to me." But these very savages detest all, who are not of their family, or their tribe; and hunt the Indians of a neighbouring tribe, who live at war with their own, as we hunt game. They know the duties of family and of relationship, but not those of humanity, which require the feeling of a common tie with beings framed like ourselves. No emotion of pity prompts them to spare the wives or children of a hostile race; and the latter are devoured in preference, at the repasts given at the conclusion of a battle, or of a warlike incursion.

The hatred which savages for the most part feel for men, who speak another idiom, and appear to them to be *barbarians* of an inferior race, is sometimes rekindled in the missions, after having long slumbered. A short time before our arrival at Esmeralda, an Indian, born in the forest * behind the Duida, travelled alone with another Indian, who, after having been made prisoner by the Spaniards on the banks of the Ventuario, lived peaceably in the village, or, as it is expressed here, "within the sound of the bell," *debaxo de la campana*. The latter could only walk slowly, because he laboured under one of those fevers, to which the natives are subject, when they arrive in the missions, and abruptly change their diet. Wearied of his delay, his fellow-traveller killed him, and hid the body behind a copse of thick trees, near Esmeralda. This crime, like many others among the Indians, would have remained unknown, if the murderer had not made preparations for a feast on the following day. He tried to induce his children, born in the mission and become Christians, to go with him for some

* *En el monte.* The Indians born in the missions are distinguished from those born in the woods. The word *monte* signifies more frequently in the colonies a forest (*bosque*) than a mountain, and this circumstance has led to great errors in our maps, on which chains of mountains (*sierras*) are figured, where there are only thick forests, *monte espeso*.

parts of the dead body. They had much difficulty in persuading him, to desist from his purpose; and the soldier, who was posted at Esmeralda, learned from the domestic squabble caused by this event, what the Indians would have hidden from his knowledge.

It is known that anthropophagy, and the practice of human sacrifices, with which it is often connected, are found in all parts of the Globe, and among people of very different races*; but what strikes us more in the study of history is, to see human sacrifices retained in a state of civilization somewhat advanced, and that the nations, who hold it a point of honor to devour their prisoners, are not always the rudest and most ferocious. This observation, which has something in it distressing and painful, has not escaped such of the missionaries, as are sufficiently enlightened to reflect on the manners of the surrounding tribes. The Ca-

* Some casual instances of children carried off by the Negroes in the island of Cuba have led to the belief in the Spanish colonies, that there are tribes of cannibals in Africa. This opinion however, supported by some travellers (*Bowdich*, p. 431), is contrary to the researches of Mr. Barrow on the interiour of that country. (*Exp. to the Zaire, Introd.* p. xx.) Superstitious practices may have given rise to imputations perhaps as unjust as those, of which Jewish families were the victims in the ages of intolerance and persecution.

bres, the Guipunavis, and the Caribbees, have always been more powerful and more civilized* than the other hordes of the Oroonoko; and yet the former two are as much addicted to anthropophagy, as the last are repugnant to it. We must carefully distinguish the different branches, into which the great family of the Caribbee nations is divided. These branches are as numerous as those of the Monguls, and the western Tatars or Turcomans. The Caribbees of the continent, those who inhabit the plains between the Lower Oroonoko, the Rio Branco, the Essequebo, and the sources of the Oyapoc, hold in horror the practice of devouring their enemies. This barbarous custom†, at the first

* Non v' è a mi credere, *toltone questo vizio di mangiare le umane carni*, una nazione più stimabile di Guipunavi. Hanno un fare Europeo, un aria militare e civile. *Gili*, tom. ii, p. 45.

† See *Geraldini Itinerarium*, p. 186, and the eloquent tract of cardinal Bembo on the discoveries of Columbus. "Insularum partem homines incolebant feri trucesque, qui puerorum et virorum carnibus, quos aliis in insulis bello aut latrociniis cepissent, vescebantur; *a feminis abstinebant*, Canibales appellati." (*Hist. Venet.*, 1551, p. 83.) The custom of sparing the lives of female prisoners confirms what I have said above, p. 293, of the *language of the women*. Does the word cannibal, applied to the Caribbees of the West India islands, belong to the language of this Archipelago (that of Haiti)? or must we seek for it in an idiom of Florida, which some traditions indicate as the first country of the Carib-

discovery of America, existed only among the Caribbees of the West Indies. It is they, who have rendered the names of cannibals, Caribbees, and anthropophagi, synonymous; it was their cruelties, that prompted the law* promulgated in 1504, by which the Spaniards were permitted to make a slave of every individual of an American nation, which could be proved to be of Caribbee origin. I believe however, that the anthropophagy of the inhabitants of the West India islands was much exaggerated in the *tales of the first travellers*†. Herera, a grave and judicious historian, has not disdained to relate these tales in the *Decades historicas*; he has even credited that extraordinary event, which led the Caribbees to renounce this barbarous custom. The natives of a little island devoured a Dominican monk, whom they had carried off from the coast of Portorico‡; they

bees? (*Petr. Martyr.*, p. 6. *Rochefort, Hist. des Antilles*, book 2, chap. 7.) If this word be significative, it seems to denote rather "strong and valiant strangers," than anthropophagi. (*Herera*, Decad. i, p. 11.) Garcia, in his etymological reveries, finds it to be simply Phenician. *Annibal* and *Cannibal*, according to him, must be derived from the same semitic root.

* See the history of this law, which declares the liberty of all nations *not Caribbees*, in *Gomara*, p. 278-281.

† *Vespucci*, p. 91. Grynæus, p. 68.

‡ *Herera, Decad.* 1, p. 13.

all fell sick, and would no more eat monk or layman."

If the Caribbees of the Oroonoko, since the commencement of the sixteenth century, have differed in their manners from those of the West India islands; if it be always erroneously, that they are accused of anthropophagy; it is difficult to attribute this difference to a melioration of their social state. The strangest contrasts are found blended in this mixture of nations, some of whom live only upon fish, monkeys, and ants; while others are more or less cultivators of the ground, more or less occupied in fabricating and painting pottery, or weaving hammocks or cotton cloth. Several of the latter tribes have preserved inhuman customs altogether unknown to the former. The character and manners of a nation are expressive at the same time, like it's language, of it's present and past state: and it is only by knowing the whole history of the civilization or degradation of a horde; it is only by tracing societies in their progressive development, and the different stages of their existence; that we can succeed in solving problems, which the knowledge of their present relations only would fail to render clear.

"You cannot imagine," said the old missionary of Mandavaca, "all the perversity of this *familia de Indios.* You receive men of a new tribe into the village; they appear to be mild,

good, and laborious; but, suffer them to take part in an incursion (*entrada*) to bring in the natives, and you can scarcely prevent them from murdering all they meet, and hiding some portions of the dead bodies." In reflecting on the manners of these Indians, we are almost terrified at that combination of sentiments, which seem mutually to exclude each other; that faculty of nations to become but partially humanized; that preponderance of customs, prejudices, and traditions, over the natural reflections of the heart*. We had a fugitive Indian from the Guaisia in our canoe, who had become sufficiently civilized in a few weeks, to be useful to us in placing the instruments necessary for our observations at night. He was no less mild than intelligent, and we had some desire of taking him into our service. What was our regret, when, talking to him by means of an interpreter, we learned, "that the flesh of the marimonde monkeys, though blacker, appeared to him to have the taste of human flesh." He told us "that his *relations* (that is the people of his tribe) preferred the inside of the hands in man, as in bears." This assertion was accompanied with gestures of savage joy. We inquired of this young man, so calm and so affec-

* I have treated of this matter in another work. See my *Americ. Monum.*, vol. i, p. 221.

tionate in the little services which he rendered us, whether he still felt sometimes a desire to eat of a Cheruvichahena. He answered without discomposure, that, living in the mission, he would only eat what he saw was eaten by *los Padres*. Reproaches addressed to the natives on the abominable practice, which we here discuss, produce no effect; it is as if a Bramin of the Ganges, travelling in Europe, reproached us with our habit of feeding on the flesh of animals. In the eyes of the Indian of the Guaisia, the Cheruvichahena was a being entirely different from himself; and whom he thought it was no more unjust to kill, than the jaguars of the forest. It was merely from a sense of propriety, that, as long as he should remain in the mission, he would only eat the same food as *los Padres*. The natives, if they return to their tribe *(al monte)*, or find themselves pressed by hunger, soon resume their ancient habits of anthropophagy. And why should we be so much astonished at this inconstancy in the tribes of the Oroonoko, when we are reminded, by terrible and well ascertained examples, of what has passed among civilized nations in times of great scarcity? In Egypt, in the thirteenth century, the habit of eating human flesh pervaded all classes of society; extraordinary snares were spread for physicians in particular. They were called to attend persons, who pretended to be

sick, but who were only hungry; and it was not in order to be consulted, but devoured. An historian of great veracity, Abd-Allatif, has related, how a practice, which at first inspired dread and horror, soon occasioned not the slightest surprise*."

Although the Indians of the Cassiquiare readily return to their barbarous habits, they display,

* *Account of Egypt by Abd-Allatif, Physician of Bagdad, translated into French by M. Silv. de Sacy*, p. 360—374. "When the poor began to eat human flesh, the horror and astonishment caused by repasts so dreadful were such, that these crimes furnished the never ceasing subject of every conversation. But at length the people became so accustomed to it, and conceived such a taste for this detestable food, that people of wealth and respectability were found to use it as their ordinary food, to eat it by way of regale, and even to lay in a stock of it. This flesh was prepared in different ways, and the practice being once introduced, spread into the provinces, so that examples of it were found in every part of Egypt. It then no longer caused any surprise; the horror, it had at first inspired, vanished; and it was mentioned as an indifferent and ordinary thing. This fury of devouring one another became so common among the poor, that the greater part perished in this manner. These wretches employed all sorts of artifices, to seize men by surprise, or decoy them into their houses under false pretences. This happened to three physicians among those who visited me; and a bookseller, who sold me books, an old and very corpulent man, fell into their snares, and escaped with great difficulty. All the facts which we relate as ocular witnesses fell under our observation accidentally, for we generally avoided seeing spectacles, which inspired us with so much horror."

while in the missions, intelligence, some love of labour, and in particular a great facility in learning the Castilian language. The villages being for the most part inhabited by three or four tribes, who do not understand each other, a foreign idiom, which is at the same time that of the civil power, the language of the missionary, affords the advantage of more general means of communication. I heard a Poignave Indian conversing in Spanish with a Guahibo, though both had come from their forests within three months. They uttered a phrase every quarter of an hour, prepared with difficulty, and in which the gerund of the verb, no doubt according to the grammatical turn of their own tongues, was constantly employed. (*When I seeing Padre, Padre to me saying**; instead of, when I saw the missionary, he said to me). I have mentioned in another place, how wise it appeared to me in the Jesuits, to generalize one of the tongues of civilized America, for instance that of the Peruvians†, and instruct the Indians in an idiom, which is foreign to them in it's roots, but not in it's structure and grammatical forms. This was following the system, which the Incas, or king-priests, of Peru had employed for ages,

* *Quando io mirando Padre, Padre me diniendo.* On adding the verb substantive, it is almost the English turn of phrase, *I was going*.

† The Qquichua language, lengua del Inga.

in order to humanize the barbarous nations of the Upper Maragnon, and maintain them under their domination; a system somewhat less strange than that of making the natives of America speak Latin, as was gravely proposed in a provincial *concile* at Mexico.

We were told, that the Indians of the Cassiquiare and the Rio Negro are preferred on the Lower Oroonoko, and especially at Angostura, to the inhabitants of the other missions, on account of their intelligence and activity. Those of Mandavaca are celebrated among the tribes of their own race, for the fabrication of the curare poison, which does not yield in strength to the curare of Esmeralda. Unhappily this fabrication occupies the natives far more than agriculture. Yet the soil on the banks of the Cassiquiare is excellent. We find there a granitic sand, of a blackish brown colour, which is covered in the forests with thick layers of *humus*, and on the banks of the river with clay almost impermeable to water. The soil of the Cassiquiare appears more fertile than that of the valley of the Rio Negro, where maize does not prosper. Rice, beans, cotton, sugar, and indigo, yield rich harvests, wherever their cultivation has been tried*. We saw wild indigo around

* Mr. Bonpland found at Mandavaca, in the huts of the natives, a plant with tuberose roots, exactly like cassava (*yuc-*

the missions of San Miguel de Davipe, San Carlos and Mandavaca. No doubt can be admitted, that several nations of America, particularly the Mexicans, long before the conquest, employed real indigo in their hieroglyphical paintings; and that small cakes of this substance were sold at the great market of Tenochtitlan*. But a colouring matter, chemically identical, may be extracted from plants belonging to neighbouring genera; and I should not at present venture to affirm, that the native *indigoferæ* of America do not furnish some generic difference from the indigofera anil, and the indigofera argentea, of the ancient continent. In the coffee-trees of the two worlds this difference has been observed.

Here, as at the Rio Negro, the humidity of the air, and the abundance of insects, which is it's natural consequence, are obstacles almost invincible to new cultivation. We never found the hygrometer of Deluc, even when the sky was serene and blue, below 52°†. Every where you meet with those large ants, that march in close bands, and direct their attacks so much the more on cultivated plants, as these are her-

ca). It is called cumapana, and is eaten baked on the ashes. It grows spontaneously on the banks of the Cassiquiare.

* See my *Polit. Essay*, vol. ii, p. 447.

† Eighty-seven degrees. Sauss.

baceous and succulent, while the forests of these countries afford only plants with woody stalks. When a missionary would cultivate sallad, or any culinary plant of Europe, he is compelled as it were, to suspend his garden in the air. He fills an old boat with good mould, and, having sowed the seeds, suspends it four feet above the ground with cords of the chiquichiqui palm tree; but most frequently places it on a slight scaffolding. This protects the young plants from weeds, worms, and the ants, which pursue their migration in a right line, and, not knowing what vegetates above, seldom turn from their course to climb up stakes, that are stripped of their bark. I mention this circumstance, to prove how difficult, within the tropics, on the banks of great rivers, are the first attempts of man to appropriate to himself a little spot of earth in that vast domain of nature, invaded by animals, and covered by spontaneous plants.

May the 13th. I had obtained during the night some observations of the stars, unfortunately the last at the Cassiquiare. The latitude of Mandavaca is 2° 4′ 7″; it's longitude, according to the time-keeper, 69° 27′. I found the magnetic dip 25·25° cent. div., so that it had increased considerably from the fort of San Carlos. Yet the surrounding rocks are of the same granite, mixed with a little horn-

blende, which we had found at Javita, and which assumes a syenitic aspect. We left Mándavaca at half after two in the morning. We had still to struggle during eight days against the currents of the Cassiquiare; and the country, through which we had to pass in order again to reach San Fernando de Atabapo, is so desert, that we could only hope after a passage of thirteen days, to find another Observantin mission, that of Santa Barbara. After six hours' voyage, we passed on the east the mouth of the Idapa, or Siapa, which rises on the mountain of Uuturan, and furnishes near it's sources a portage to the Rio Mavaca, one of the tributary streams of the Oroonoko. This river has white waters, and is not more than half as broad as the Pacimoni, the waters of which are black. It's upper course is strangely disfigured on the maps of La Cruz and Surville, which have served as models to all subsequent maps. I shall have occasion to mention the hypotheses, that have given rise to these errors, in speaking of the origin of the Oroonoko. If father Caulin could have seen the map, which has been prefixed to his work, he would have been surprised to find fictions reproduced in it, which he has himself combated by accurate ideas acquired on the spot. This missionary simply says, that the Idapa rises in a mountainous country, near which live the Amuisana Indians. These In-

dians have been transformed into Amoizanas, or Amazons; and the Rio Idapa has been made to rise from a spring, which, the moment it issues out of the ground, divides itself into two branches, the courses of which are diametrically opposite. This bifurcation of a spring is altogether imaginary.

We stopped near the raudal of Cunuri. The noise of the little cataract augmented sensibly during the night. Our Indians asserted, that it was a certain presage of rain. I recollected, that the mountaineers of the Alps have great confidence in the same prognostic*. In fact, it

* "It is going to rain, because we hear the murmur of the torrents nearer," say the mountaineers of the Alps, like those of the Andes. Mr. Deluc has tried to explain this phenomenon by a change in the barometric pressure, by an increase in the number of the bubbles of air, that burst at the surface of the water. (*Modificat. de l'Atmosphère*, § 1031.) This explanation is equally forced and unsatisfactory. I will not attempt to replace it by another hypothesis, but I shall observe, that the cause of the phenomenon is a modification of the atmosphere, which has an influence at once on the *sonorous* and on the *luminous undulations*. The prognostic drawn from the increase and the intensity of sound is intimately connected with the prognostic drawn from a less extinction of light. The mountaineers predict a change of weather, when, the air being calm, the Alps covered with perpetual snows seem on a sudden to be nearer the observer, and their outlines appear with great distinctness on the azure vault of the sky. What is it, that causes the want of homogeneity in the vertical strata of the atmosphere to disappear instantaneously?

rained long before sunrise; and the araguate monkeys had warned us by their lengthened howlings of the approach of the shower, long before the noise of the cataract increased.

May the 14th. The *moschettoes*, and still more the ants, drove us from the shore before two in the morning. We had till then believed, that the latter did not crawl along the cords, by which the hammocks are usually suspended; but whether this opinion were erroneous, or the ants fell upon us from the tops of the trees, it is certain, that we had great difficulty to keep ourselves free from these troublesome insects. The river became narrower as we advanced, and it's banks were so marshy, that it was not without much labour Mr. Bonpland could get to a carolinea princeps loaded with large purple flowers. This tree is the most beautiful ornament of these forests, and of those of the Rio Negro. We examined repeatedly, during this day, the temperature of the Cassiquiare. The water at the surface of the river was only 24° (when the air was at 25·6°). This is nearly the temperature of the Rio Negro, but four or five degrees less than that of the Oroonoko*. After having passed on the west the mouth of the *Canno* Caterico, which has black waters of extraordinary transparency, we left the bed of the

* See vol. iv, p. 500 and 572; and p. 163 and 217 of the present volume.

river, to land at an island on which the mission of Vasiva is established *. The lake, which surrounds this mission, is a league broad, and communicates by three outlets with the Cassiquiare. The surrounding country, full of marshes, is extremely feverish. The lake, the waters of which appear yellow by transmitted light, is dry in the season of great heat, and the Indians themselves are unable to resist the miasmata, that rise from the mud. The complete absence of wind contributes to render the climate of this country more pernicious. A sketch of the plan of Vasiva, which I drew on the day of our arrival, I have had engraved. Part of the village has been removed to a dryer spot, toward the north, and this change has become the source of a long quarrel between the governor of Guyana and the monks. He maintained, that they had no right to remove their villages without the permission of the civil power; but, being completely ignorant of the situation of the Cassiquiare, he addressed his reprimands to the missionary of Carichana, who lives at the distance of one hundred and fifty leagues from Vasiva, and could not comprehend what was meant. These geographical mistakes are very common in countries, that are generally governed by men who have never been in possession of a map. The

* Barometer at Vasiva, 327·2 lines.

mission of Padamo was given in 1785 to father Valor, with an injunction, to " repair thither immediately, the Indians being without a pastor." This was more than fifteen years after the village of Padamo had ceased to exist, and the Indians had fled *al monte*.

From the 14th to the 21st of May we slept constantly in the open air; but I cannot indicate the spots where we halted. These regions are so wild, and so little frequented, that with the exception of some rivers, the Indians were ignorant of the name of all the objects which I set by the compass. No observation of a star helped me to fix the latitude in the space of a degree. After having passed the point* where the Itinivini separates itself from the Cassiquiare, to take it's course to the west, toward the granitic hills of Daripabo, we found the marshy banks of the river ornamented with bamboos. These arborescent gramina rise to the height of twenty feet; their stem is constantly arched toward the summit. It is a new species of bambusa with very broad leaves. Mr. Bonpland fortunately found one in flower; a

* It is above Vasiva, nearly in 2° 30′ of latitude; the same branch of the Cassiquiare enters, by the name of the Conorichite, into the Rio Negro, near Tomo. (See above, p. 358.) More to the north come in succession the Canno Curamuni, the Port of wild Cacao-trees, the Rio Maminavi, the lake Duractumuni, and the Rio Pamoni.

circumstance I mention, because the genera nastus and bambusa had before been very badly distinguished, and nothing is more rare in the New World, than to see these gigantic gramina in flower. Mr. Mutis herbalised during twenty years in a country, where the bambusa guadua forms marshy forests several leagues broad, without having ever been able to procure the flowers. We sent that learned naturalist the first ears of bambusa from the temperate vallies of Popayan. From what cause do the parts of fructification develope themselves so rarely in a plant that is indigenous, and that vegetates with such extraordinary vigor, from the level of the ocean to that of nine hundred toises, that is to a subalpine region, the climate of which, between the tropics, resembles that of the south of Spain? The bambusa latifolia seems to be peculiar to the basins of the Upper Oroonoko, the Cassiquiare, and the Amazon; it is a *social plant*, like all the gramina of the family of the nastoides*; but in that part of Spanish Guyana which we traversed it does not form those

* See for the natural history of this family my work *de Distribut. geogr. Plant.*, p. 206—214. With the bambusa latifolia, which Mr. Bonpland has described and drawn in our *Equinoxial Plants*, vol. i, p. 68, the pariana campestris, dufourea glabra, and some fine species of the arborescent hypericum, grow on the banks of the Cassiquiare.

large assemblages, which the Spanish Americans call *guadales*, or forests of bamboos.

Our first resting place above Vasiva was easily arranged. We found a little nook of dry ground, free from shrubs, to the south of the *Canno* Curamuni, in a spot where we saw some capuchin monkeys*, recognizable by their black beard, and their gloomy and sullen air, walking slowly on the horizontal branches of a genipa. The five following nights were so much the more troublesome, as we approached the bifurcation of the Oroonoko. The luxuriousness of the vegetation increases in a manner, of which it is difficult even for those, who are accustomed to the aspect of the forests between the tropics, to form an idea. There is no longer a beach: a palisade of tufted trees forms the bank of the river. You see a canal two hundred toises broad, bordered by two enormous walls, clothed with lianas and foliage. We often tried to land, but without being able to step out of the boat. Toward sunset we sailed along the bank for an hour, to discover, not an opening (since none exists), but a spot less wooded, where our Indians by means of the hatchet and manual labour, could gain space enough for a resting place for twelve or thirteen persons. It

* Simia chiropotes, a new species. (See my *Rec. d'Obs. Zool.*, vol. i, p. 312, 315, 358.)

was impossible to pass the night in the canoe; the *moschettoes*, which tormented us during the day, accumulated toward evening beneath the *toldo*, that is, the roof covered with palm leaves, which served to shelter us from the rain. Our hands and faces had never before been more swelled. Father Zea, who till then boasted of having in his missions of the cataracts the largest and most valiant moustiques (*las mas feroces*), at length gradually acknowledged, that the sting of the insects of the Cassiquiare was the most painful he had ever felt. We experienced great difficulty amid a thick forest in finding wood to make a fire, the branches of the trees, in those equatorial regions where it always rains, being so full of juice, that they will scarcely burn at all. Where there is no bare shore, that old wood can scarcely be procured, which the Indians say is *baked in the sun.* However, fire was necessary to us only as a defence against the beasts of the forest; for we had such a scarcity of provision that we had little need of it to prepare our food.

On the 18th of May, toward the evening, we discovered a spot where the bank of the river was furnished with wild cacao-trees. The nut of these cacaos is small and bitter; the Indians of the forest suck the pulp, and throw away the nut, which is picked up by the Indians of the missions, and sold to persons who are not very

nice in the fabrication of their chocolate. "This is the *Puerto del Cacao*," said the pilot; "it is here our Padres sleep, when they go to Esmeralda to buy *sarbacans* and juvia (the pleasant nuts of the bertholletia)." Not five boats however pass annually by the Cassiquiare; and since we left Maypures, that is for a whole month, we had not met one living soul on the rivers which we went up, except in the immediate neighbourhood of the missions. To the south of lake Duractumuni we slept in a forest of palm trees. It rained violently, but the pothoses, arums, and lianas, furnished so thick a natural trellis, that we were sheltered as under a vault of foliage. The Indians, whose hammocks were placed on the edge of the river, interwove the heliconias and other musaceæ, so as to form a kind of roof over them. Our fires lighted up to the height of fifty or sixty feet the palm trees, the lianas loaded with flowers, and the columns of white smoke, which ascended in a straight line toward the sky. The whole exhibited a magnificent spectacle; but, to enjoy it with tranquillity, we should have breathed an air free from insects.

The most discouraging of all physical sufferings are those, which, uniform in their duration, can be combated only by long patience. It is probable, that in the exhalations of the forests of the Cassiquiare Mr. Bonpland imbibed the seeds

of that severe malady, under which he nearly sunk on our arrival at Angostura. Happily for him and for me, nothing led us to presage the danger, with which he was menaced. The view of the river, and the hum of the insects, were a little monotonous; but some remains of our natural cheerfulness enabled us to find sources of relief amid our wearisome voyage. We discovered, that by eating small portions of dry cacao, ground without sugar, and drinking a large quantity of the river water, we succeeded in appeasing our appetite for several hours. The ants and the *moschettoes* occupied us more than the humidity and the want of food. Notwithstanding the wants to which we were exposed during our excursions in the Cordilleras, the navigation from Mandavaca to Esmeralda has always appeared to us the most painful part of our travels in America. I advise those, who are not very desirous of seeing the great bifurcation of the Oroonoko, to take the way of the Atabapo in preference to that of the Cassiquiare.

Above the *Canno* Duractumuni, the Cassiquiare pursues a uniform direction from north-east to south-west. There, on it's right bank, they have begun to found the new village of Vasiva. The missions of Pacimona*, Capivari,

* Perhaps it may have been intended to indicate Mandacava under this name.

and Buenaguardia, like the pretended fort near the lake of Vasiva, are only fictions of our maps. We were surprised to see how much the high steep banks of the Cassiquiare had been undermined on each side by the sudden risings of the river. Trees rooted up formed as it were natural rafts; and, half buried in the mud, were extremely dangerous for canoes. It is probable, that, if the bark of the traveller were overset in this uninhabited region, he would disappear, without any indication of his misfortune marking where, or how he had perished. It would merely be known long after, that a boat, which left Vasiva, had never been seen a hundred leagues off, at the missions of Santa Barbara and of San Fernando de Atabapo. We passed the night of the 20th of May, the last of our voyage on the Cassiquiare, near the point of the bifurcation of the Oronooko. We had some hope of being able to make an astronomical observation, as falling stars of remarkable magnitude were visible through the vapours, that veiled the sky; whence we concluded, that the stratum of vapors must be very thin, since meteors of this kind have scarcely ever been seen below a cloud. Those we now beheld shot toward the north, and succeeded each other at almost equal intervals. The Indians, who little ennoble by their expressions

the wanderings of imagination, name the falling stars the *urine;* and the dew the *spittle of the stars**. The clouds thickened anew, and we discerned neither meteors, nor the real stars, for which we had impatiently waited during several days.

We had been told, that we should find the insects at Esmeralda "still more cruel and voracious," than in the branch of the Oronooko which we were going up; notwithstanding this expectation, we indulged with satisfaction the hope of sleeping at length in a spot that was inhabited, and of taking some exercise in herbalizing. Our satisfaction however was disturbed at our last resting place on the Cassiquiare. I shall venture to relate a fact, which has nothing in it very interesting to the reader, but which I think I may be permitted to record in a journal that depicts the incidents of a voyage through so wild a country. We slept on the edge of a forest. In the middle of the night we were warned by the Indians, that they heard very near us the cries of the jaguar, and that they came from the top of some neighbouring trees. Such is the thickness of the forests in these regions, that scarcely any animals are to be found there, but such as climb trees, the quadrumanes, the cercoleptes, the viverras, and

* In Tamanac, *chirique-chucuru* and *urrupu-saccare.*

various species of the felis genus. Our fires burning bright, and having by long habit become tranquil (I might almost say systematically) respecting dangers that are not chimerical, we paid little attention to the cries of the jaguars. They were attracted by the smell and voice of our dog. This animal (which was of the mastiff breed) began at first to bark; and, when the tiger drew nearer, to howl, hiding himself below our hammocks, as if he sought for the succour of man. During our halts on the banks of the Rio Apure, we had been accustomed to these alternations of courage and fear in this young animal, which was gentle and extremely carressing. How great was our chagrin, when in the morning, at the moment of re-embarking, the Indians informed us, that the dog had disappeared! There could be no doubt, that it had been carried off by the jaguars. Perhaps, hearing their cries no longer, it had wandered from the fires on the side of the beach; perhaps we had not heard it's moans, being plunged in a profound sleep. We have often heard the inhabitants of the banks of the Oroonoko and the Rio Magdalena affirm, that the oldest jaguars, consequently those that have hunted at night during several years, are sufficiently cunning to carry off animals from the midst of a halting place, grasping the neck so as to prevent their cries. We waited part of the

morning in the hope, that our dog had only strayed. Three days after we came back to the same place; we heard again the cries of the jaguars, for these animals have a predilection for particular spots; but all our researches were vain. The dog, which had accompanied us from Caraccas, and had so often in swimming escaped the pursuit of the crocodiles *, had been devoured in the forest. I mention this incident only to throw some light on the artifices of those large cats with speckled coats.

May the 21st. We again entered the bed of the Oroonoko, three leagues below the mission of Esmeralda. It was then a month since we had left that river near the mouth of the Guaviare. We had still a voyage of seven hundred and fifty miles † to perform to Angostura, but it was with the stream, and this consideration lessened our discouragement. In descending great rivers, the rowers take the *thalweg*, the middle of the bed, where there are few moschettoes; while in going up they are obliged, in order to avail themselves of the dead waters and counter currents, to sail near the shore, where the proximity of the forests, and the *detritus* of organic substances thrown on the beach, accu-

* See vol. iv, p. 425.

† Of nine hundred and fifty toises each, or two hundred and fifty nautical leagues.

mulate the tipulary insects*. The point of the celebrated bifurcation of the Oroonoko has a very imposing aspect. Lofty granitic mountains rise on the northern bank; and amid them are discovered at a distance the Maraguaca and the Duida. There are no mountains on the left bank of the Oroonoko, west or east of the bifurcation, till opposite the mouth of the Tamatama. There stands the rock Guaraco, which is said to throw out flames from time to time in the rainy season. When the Oroonoko is no longer surrounded by mountains toward the south, and reaches the opening of a valley, or rather a depression of the ground, which terminates at the Rio Negro, it divides itself into two branches. The principal trunk (the Rio Paragua of the Indians) continues it's course toward the west-north-west, turning round the group of the mountains of Parime; the branch which forms the communication with the Amazon runs into plains, the general slope of which is toward the south, but of which the partial planes incline in the Cassiquiare toward the south-west, and in the basin of the Rio Negro toward the south-east. A phenomenon so strange in appearance, which I verified on the spot, merits particular attention; and so much the more, as it may

* Orellana has made the same observation in the Amazon. (*Southey*, vol. i, p. 618.)

throw some light on analogous facts, which are thought to have been observed in the interior of Africa. I shall terminate this chapter by some general reflexions on the *hydraulic system* of Spanish Guyana; and shall prove, by examples drawn from the ancient continent, that this bifurcation, which has so long confounded the geographers who have constructed maps of America, is the effect of a concurrence of circumstances, which, though rare, are to be found alike in both hemispheres.

Accustomed to consider the rivers of Europe only in that part of their course where they are contained between two *lines of ridges* [*lignes de faites*], consequently enclosed in vallies; and forgetting, that the obstacles which inflect both the tributary streams and principal recipients are less frequently chains of mountains, than small risings of counter-slopes; we find a difficulty in conceiving the simultaneous existence of these windings, these bifurcations, these communications of rivers in the New World. That vast continent is still more remarkable for the extent and uniformity of it's plains, than for the gigantic elevation of it's Cordilleras. The phenomena which we observe in our hemisphere only on the coast of the ocean, or round the inland seas in the steppes of Bactriana, the Aral, and the Caspian, are found in America three or four hundred leagues distant from the

mouths of rivers. The small streamlets of water, which wind along our meadows (the most perfect of our plains) may convey a feeble image of these interbranchings and bifurcations; but disdaining to pause on objects so diminutive, we are more struck with the contrast than the analogy of the hydraulic systems of the two worlds. The idea, that the Rhine might send out a branch to the Danube, the Vistula to the Oder, the Seine to the Loire, appears at first sight so absurd, that, even when we no longer doubt of the communication between the Oroonoko and the Amazon, we still require, that the possibility of what exists should be proved.

In going up by the *delta* of the Oroonoko toward Angostura and the confluence of the Rio Apure, we leave the high chain of the mountains of Parime constantly on our left. This chain, far from forming (as several celebrated geographers have admitted) a barrier, that separates the two basins of the Oroonoko and the Amazon, furnishes on the contrary on it's southern side, or back, the sources of the former of these rivers. The Oroonoko (exactly like the Arno in the celebrated *voltata* between Bibicuo and Ponta Sieve) describes three quarters of an oval, the greatest axis of which lies in the direction of the latitude. It turns round a group of mountains, which from it's two opposite sides alike sends down to it waters. From

the Alpine vallies of the Maraguaca, the river runs first toward the west, and west-north-west, as if it were flowing to the South Sea; when, near the confluence of the Guaviare, it begins to bend toward the north, and follows the direction of a meridian as far as the mouth of the Apure, which is a second *point of counterflexure* [*rebroussement.*] In this part of it's course the Oroonoko fills a sort of gutter, formed by the gentle slope which descends from the very remote chain of the Andes of New Grenada, and the very short counterslope rising on the east toward the abrupt side of the mountains of Parime. This disposition of the ground is the cause of the largest tributary streams of the Oroonoko being those of the west. The *principal recipient* being very near the mountains of Parime, which it turns round from south to north (as if it would run toward Porto Cabello, on the northern coast of Venezuela), it's bed is obstructed by rocks. This is the region of the Great Cataracts; the river, roaring along, opens itself a passage across the buttresses that project toward the west; so that, in the *great land strait** between the Cordilleras of New Grena-

* (*Détroit terrestre.*) This is an opening eighty leagues broad, the only one by which the *united basins of the Upper Oroonoko and the Amazon* communicate with the *basin of the Lower Oroonoko*, or the Llanos of Venezuela. We consider this opening geologically as a *land strait*, because it affords a passage to running waters; and because, without this *the*

da and the Sierra Parime, the rocks which skirt the western bank belong to this very Sierra. Near the confluence of the Rio Apure, the Oroonoko changes a second time, and almost suddenly, it's direction from south to north to a direction from west to east, as we have seen the confluence of the Guaviare mark the point, where the course toward the west is converted abruptly into a direction toward the north. In these two inflexions, it is not the impulsion of the waters of the tributary stream only, that determines the direction of the principal recipient, but also a peculiar disposition of the slopes and counter-slopes, which has an influence on the direction of the confluents, or secondary rivers, and at the same time on that of the Oroonoko. We should seek in vain on these *points of counterflexure*, so important to geography, any mountains or hills, that prevent the great river from continuing it's original course. None exist at the mouth of the Guaviare; and the little hill of Cabruta, near the confluence of the Apure, has certainly had no influence on the direction of the Oroonoko. These variations of direction are the effect of more general causes; they result from the dis-

chain of Parime, which extends from east to west, like the chains of the coast of Caraccas, and of Mato-Grosso, or Chiquitos, would be immediately connected with the Andes of New Grenada.

position of the great slopes, which compose the polyedrical surface of the plains. The chains of mountains do not rise like walls on horizontal plains; their masses, more or less prismatic, are always supported by table-lands, and these are lengthened out into slopes, more or less inclining toward the *thalweg* of the river. It is therefore because the plains rise toward the mountains, that the rivers so seldom break against the mountains; and that they feel in some sort the influence of those *lines of ridges* at very great distances. The geographers who have studied topography in nature, and who have taken levels of the ground, will not be surprised to see, that in maps, the scale of which does not admit of marking the inclinations of slopes from three to five degrees, nothing materially indicates the causes of the great inflexions of rivers. The Oroonoko, from the confluence of the Apure to it's mouth on the eastern coast of America, runs in a line parallel to it's first direction, but in an opposite course. It's *thalweg* is formed on the north by an almost imperceptible slope, which rises toward the chain on the shore of Venezuela; and on the south by the short and steep counter-slope, which rests on the Sierra Parime. By this particular disposition of the ground, the Oroonoko surrounds the same group of granitic mountains on the south, the west, and the north; and, after a course of

one thousand three hundred and fifty miles (at nine hundred and fifty toises), is found only three hundred miles distant from it's sources. The mouth of this river is situate nearly in two degrees, the meridian of it's springs.

The course of the Oroonoko, of which we have rapidly traced the sketch, displays three peculiarities well worthy of attention. 1st. The constancy with which it remains near the group of mountains, round which it turns at the south, the west, and the north; 2dly, the situation of it's sources on ground, which would seem to belong to the basins of the Rio Negro and the Amazon; 3dly, it's bifurcation, sending a branch to another system of rivers. According to ideas purely theoretic, we should be tempted to admit, that rivers, having once issued from Alpine vallies, at the tops of which they take birth, must rapidly leave the mountains on a plane more or less inclined, the greatest declivity of which would be perpendicular to the axis of the chain, or the principal *line of ridges*. Such a supposition, however, would be contrary to what we observe in the most majestic rivers of India and China. A characteristic feature* of these

* *Ritter Erdkunde*, vol. i, p. 248. We must not confound those rivers, which during some time stretch along a chain of mountains, after having reached the plains, with those rivers that flow in valleys which are longitudinal, and consequently parallel also to the great axis of the chain.

rivers is, that, on issuing from the mountains, they pursue a course parallel to the chain. The plains, the slopes of which rise toward the mountains, take irregular forms at their feet. The nature of these foliated rocks, and the direction of the strata, parallel to the direction of the great chains, may often be the cause of the phenomenon we are discussing: but the granite of the Sierra Parime, being almost always in mass, and not stratified, the proximity in which the Oroonoko follows the outlines of this group of mountains indicates a depression of the ground, which arises from a greater geological phenomenon, from a cause connected perhaps with the formation of the Cordilleras itself. In inland seas and lakes, the deepest places are those, where the coast is most elevated and abrupt. When we descend the Oroonoko from Esmeralda to Angostura, whether our course be toward the west, the north, or the east, in a distance of two hundred and fifty leagues, we always perceive very lofty mountains on the right bank; and plains, that extend as far as the eye can reach, on the left. The line of the greatest depths, of the *maxima* of depression, is consequently found at the very foot of the Cordillera, on the circumference of the Sierra Parime.

Another peculiarity in the course of the Oroonoko, which strikes us at the first view, is that

the basin of this river seems to be primitively confounded with the basin of another river, that of the Amazon. In casting a look at the map, we see the Upper Oroonoko traverse the same plain from east to west, through which the Amazon runs in a parallel but contrary direction; that is, from west to east. This identity of their basins however is merely apparent; it must not be forgotten, that the great surfaces of ground, which we call plains, have their valleys like the mountains. Every plain is composed of different systems of alternate slopes*; and these systems are found to be separated by ridges, or *secondary lines of elevation*, which their small height renders almost imperceptible to the eye. A continued plain, covered with forests, fills the vast space between 3° 30′ of north and 14° of south latitude, between the Cordillera of Parime and that of Chiquitos and of Brazil†. All the waters, as far as the parallel of the sources of the Rio Temi‡, on a surface of two hundred and four thousand square leagues§, flow into the principal recipient of the Amazon; but farther north, from a particular disposition of the

* Slopes which incline in opposite directions, with respect to the horizon.

† See chap. 17, vol. iv, p. 306; and the present chap. p. 410.

‡ North latitude 2° 45′.

§ A surface ten times greater than all France.

ground, on a surface of less than fifteen hundred square leagues, another great river, the Oroonoko, forms a distinct hydraulic system. The central plain of South America comprehends consequently, two *basins of rivers;* for a basin is the whole of all the surfaces of circumjacent lands, the lines of the greatest slope in which terminate in the *thalweg*, that is to say, in the longitudinal depression, which forms the bed of the principal recipient. In the short space between the longitude of sixty-eight and seventy degrees, the Oroonoko receives the waters which flow down the southern slope of the Cordillera of Parime; but the streams * which issue from the same slope east of the meridian of sixty-eight degrees, between Mount Maraguaca, and the mountains of Portugueze Guyana, flow to the Amazon. It is therefore only on a length of fifty leagues, that, in this immense equatorial valley, planes situate immediately at the foot of the Cordillera of Parime have lines of the great-

* The Padaviri and the Rio Branco (tributary streams of the Rio Negro); the Rio Trombetas, the Gurupataba, and the Rio Para, which fall immediately into the Amazon. These rivers, all belonging to the same basin, rise from the continuation of the Cordillera of Parime, east of the sources of the Oronooko, where this Cordillera stretches along by the Sierra Pacaraimo (the point of division between the waters of the Rio Branco and those of the Rio Carony) toward French and Portugueze Guyana, that is, toward the sources of the Essequibo and the Oyapoc.

est declivity, which lead *out of the valley* first to the north, and then toward the east. Hungary* furnishes an analogous and very remarkable example of rivers, which, rising on the south of a chain of mountains, belong to the hydraulic system of it's northern declivity. The division of waters between the Baltic and the Black Sea is found on the south of Tatra, one of the groupes of the Carpathian mountains, between Teplicz and Ganocz, on a table-land which has only three hundred toises of elevation. The Waag and the Hernad flow south, toward the Danube; while the Poprad turns round the group of Tatra to the west, and with the Dunajetz runs north into the Vistula. The Poprad, which by it's situation seems to belong to the tributary streams of the Black Sea, disengages itself apparently

* The Carpathian mountains, which are generally represented as an uninterrupted chain between Poland and Hungary, only form elevated groups, connected together by table-lands of two or three hundred toises high. Thus the group of Tatra, to which belongs the Peak of Lomnitz, one thousand three hundred and tweny toises in height, terminates abruptly at the east, while on the west it is united by a very long ridge to the group of Tatra, which has only nine hundred toises of absolute elevation. The Dunajetz, which rises on the *north* of Tatra, receives the Poprad, which comes from the *southern* slope of the same group; the Waag, which rises on the *south*, receives the Arva, which comes from the *northern* declivity. See the great *Map of Hungary by Lipsky and Wahlenberg*, *Flora Carpath.*, p. xxxiii and lix.

from their basin, and mingles it's waters with those of the Baltic.

In South America an immense plain contains the basin of the Amazon, and a portion of the basin of the Oroonoko: but in Germany, between Melle and Osnabrueck, we have the rare example of a very narrow valley containing two basins of little rivers independant of each other. The Else and the Haase begin to rise in a near and parallel course from south to north; but on entering the plain, they diverge to the east and west, and join two hydraulic systems entirely different, those of the Werra and of the Ems.

I come now to the third peculiarity to be observed in the course of the Upper Oroonoko, that *bifurcation*, the existence of which was held in doubt at the moment of my departure for America. This bifurcation (*divergium amnis*), according to the astronomical observations*

* These observations were of some importance, because no other has ever been made at a more central point of South America, north of the equator. In the night of the 22d of May, I observed the passage over the meridian of α of the Cross, and β of the Centaur. The first gives, for the latitude of the mission of Esmeralda, 3° 11′ 8″; the second. 3° 10′ 52″. Six horary angles of the Sun, none of which differed more than 1·2″ from the mean, fix, according to the chronometer, the longitude of the mission at 68° 23′ 19″. As the rate of the timekeeper could be verified by twice passing the

which I made at the mission of Esmeralda, is in 3° 10′ of north latitude, and 68° 37′ of longi-

Great Cataracts and the mouth of the Apure, and as the daily loss was extremely uniform (between San Fernando de Atabapo and Maypures, at 24° and 29° of temperature, 28·5″; between San Fernando de Atabapo, the Rio Negro, the Cassiquiare, and Esmeralda, from 22° to 24° of temperature, 27·9″), the central point of Esmeralda may be considered as sufficiently well determined. This may be relied on with more confidence, as my chronometric longitudes of the interior rest on those of Cumana and Caraccas, two points of the coast where I had observations of the satellites of Jupiter, lunar distances, and an eclipse of the Sun. The positions of the maps which appeared before the publication of my observations of the Oroonoko err by excess toward the east and the south. D'Anville alone, by a happy tact, saw better than those who have followed him. As geographers heretofore differed much in the absolute longitudes, which they assigned to the points of land-fall (at Barbadoes, the island of Trinidad, or at Cumana), I have reduced, in the following table, the longitudes to the meridian of the Castle of Saint Antonio at Cumana:

ESMERALDA.

W.	lat. 3° 11′	long. 1° 53′	from astronomical observ.
W.	1 58	2 19	D'Anville.
E.	3 40	0 15	La Cruz Olmedilla.
E.	3 38	0 18	Surville and Caulin.
E.	3 28	0 8	Faden.
W.	3 38	0 8	Buache.

The Spanish maps, constructed from the materials furnished by the expedition of Solano, admit 3° 44′ for the difference of meridians between Esmeralda and San Fernando de Atabapo; but it is only 2° 7′. These same maps place Esmeralda

tude west of the meridian of Paris. What we find in all the zones along the coast occurs in the interior of South-America. Very simple geometric considerations enable us to conceive, that the configuration of the soil, and the impulse of the tributary streams, modify the direction of the running waters according to stable and uniform laws. The *deltas* are the effect of a bifurcation in the plain of a shore; and on observing them carefully, we sometimes find, near the bifurcation, communications with other rivers, branches of which are in the vicinity. Now, wherever, in the interior of great continents, we find a flat surface like that of a shore, the same phenomena must occur. The causes that produce bifurcations near the mouth of a great river may also give rise to them near it's source, and in the upper part of it's course. Three circumstances contribute toward this principally; the very small undulations of a plain, that contains at once two basins of rivers,

at 11° 35′ from Cayenne; the real distance is 13° 48′. (See for the bases of these calculations the *Rec. d'Observ. Astr.*, which I published conjointly with Mr. Oltmans, vol. 1, p. 255 and 261—278). These remarks I believe will suffice, to lead those who occupy themselves with astronomical geography to perceive, that I had some motives for considering the astronomical observations made on the banks of the Upper Oroonoko, the Cassiquiare, and the Rio Negro, as very essential to the improvement of the maps of America.

the breadth of one of the principal recipients, and the situation of the *thalweg*, at the very edge of the limit of the two basins.

If the line of the greatest slope pass through a given point, and if, indefinitely prolonged, it do not meet the river, that point (whatever may be it's proximity to the *thalweg*) scarcely belongs to the same basin. In adjacent basins we often see the tributary streams of one recipient rise very near to another recipient, between two tributary streams of the latter. These particular relations of coordination, which are observed in alternate slopes, give forms that are more or less sinuous to the boundaries of the basins. The longitudinal furrow, or *thalweg*, is not necessarily found in the middle of the basin: it does not even always occupy it's lowest parts; for these parts may be environed by ridges, that prevent their being reached by the most sloping lines. The unequal length of two tributary streams, that terminate at the two banks of the same river, enables us to judge with some precision of the situation of the *thalweg* with respect to the boundaries of the basin. When the principal recipient approaches one of these boundaries, when it flows near the ridge that constitutes the line of partition between the two basins, there is the greatest chance of a bifurcation. The least depression of this ridge may then cause the phenomenon which we are discussing, if an

acquired velocity do not retain the whole of the river in it's bed. The bifurcation takes place, when the limit of the two basins crosses the bed of the principal recipient longitudinally: it is then that a part of the *thalweg* of *a* contains some points, the most sloping lines of which lead to the *thalweg* of *b*. The branch which is separated can no more return toward *a*; for a stream of water, which has once entered a basin, can never extricate itself, without having passed through the bed of the river, where all the waters of the basin unite.

It remains to examine, how in similar circumstances the breadth of a river favours the chance of these bifurcations, which, like *canals with points of partition* *, furnish, from the natural disposition of the ground, a navigable line between the basins of two neighbouring rivers. On sounding a river in a transverse line, we observe, that it's bed is ordinarily composed of several furrows of unequal depths. The broader a river is, the more numerous are these furrows; they even preserve at great distances a parallelism more or less perfect. Hence it results, that rivers may for the most part be considered as

* In canals dug by the hand of man, the *summit line* (*ligne de faites*) is placed between the two recipients; on the contrary, in the branches that unite naturally two systems of rivers, the *line of elevation*, or the ridge of partition, cuts the bed of one of the two rivers longitudinally.

composed of several canals very close to each other, and that a bifurcation is formed, when a small portion of ground near the bank is lower than the bottom of a lateral furrow *.

According to the circumstances which we have just related, the bifurcations of rivers take place either in the same basin, or on the ridge of a partition between two basins. In the first case, they are either branches †, that reenter the *thalweg* from which they were separated at a greater or less distance, or branches ‡ which join the lower tributary streams §. When the bifur-

* See the memoir of Hydrography, which I published in 1810 in the *Journal de l'Ecole Polytechnique*, vol. 4, p. 65—68.

† Near the principal recipient, the connection between the alternate slopes of different orders is generally such, that the branches seldom flow from it. The great island, however, on which the village of Morales stands, is three or four leagues broad between the principal recipient of the Rio Magdalena and the *Brazo de Ocana*.

‡ See my maps of the Rio Apure and the Rio Magdalena. The Guaricoto issues from the Apure to join the Portugueza, which is a tributary stream of the Apure. Thus the *Caño* de Lobo separates itself from the Magdalena to fall into the Cauca. (See above, on an analogous interbranching of the Amazon and the Jupura, p. 359.) As our maps in general do not indicate the direction of the course of the waters, the land lying between different branches of rivers, of which the uppermost take water from the principal recipient while the lowermost give water to it, is often taken, on a simple inspection of the figure, for a *delta* of tributary streams.

§ There are, 1st, *Oceanic deltas*, as at the mouths of the

cation takes place at the boundary of two basins, and this boundary passes through the bed of the principal recipient, the branch that runs off establishes an hydraulic communication between two systems of rivers, and fixes our attention the more in proportion as it is broader and more navigable. The Cassiquiare is two or three times broader than the Seine near the *Jardin des Plantes*; and to show how remarkable this river is, I shall mention *, that, on seeking care-

Oroonoko, the Rio Magdalena, and the Ganges; 2dly, *deltas*, on the shore of *inland seas*, like those of the Oxus, and of the Sihon, or Sir; 3dly, *deltas of tributary streams*, like those at the mouth of the Apure, the Arauca, and the Rio Branco. When several secondary rivers are formed in the vicinity of the *deltas of tributary streams*, all that is observed on the shore near *Oceanic deltas* takes place in the inlands; the nearest branches communicate their waters to each other, and form a net-work of rivers, that can with difficulty be recognized in the time of great inundations. On an extraordinary interbranching with a counterslope, see above, p. 377.

* I take into consideration only the communication between two systems of independant rivers (that is, of rivers both of which flow into the Ocean), and I suppose, that these communications take place far from the shore, by means of a branch that issues from one of the principal recipients to fall into the other, either directly, or by joining a tributary stream. I exclude consequently *Oceanic* bifurcations or *deltas;* branches which a river near the coast sends to another river flowing into the Ocean very near the former; the numerous examples of communications of rivers observed in the inlands between two tributary streams of the same river; finally, the lakes or marshes situate on a *line of ridges* between two

fully for examples of bifurcations in the interior of countries, even among streams much less considerable, I have hitherto found only three or four with any certainty. I shall not mention the interbranchings of the great rivers of Indo-China, the natural canals that seem to unite the rivers of Ava and Pegu*, and those of Siam and Cambodja; the mode of these communications not having been sufficiently examined. I shall

basins, and, like the pools of Longpendu in France (Brisson, in the *Journal de l'Ecole Polyt.*, vol. 7, p. 280), like lake Lessoe in Norway (Buch, *Voyage en Laponie*, vol. 1, p. 182), like the lakes and marshes of the governments of Olonetz and of Perme in Russia, and those of the steppes (*pampos*) of Patagonia, pouring their waters into two systems of rivers independent of each other.

* According to the researches of Mr. Dalrymple, the Anan appears to form, at a hundred leagues from the coast, a canal, resembling that of the Cassiquiare, between the Mei-Kong, or Cambodja, and the Menam, or River of Siam. The communications between the great river Ava or Irawaddy, and the Sittang or Martaban (River of Pegu?), appear to me to be owing only to the overflowing of some lakes at a point of partition between the two basins, far from the bed of the two principal recipients. (See the great map of Asia by Mr. Arrowsmith, 1818, and a judicious disquisition on the course of the river of the Birman empire in *Malte-Brun, Geogr.*, vol. 4, p. 170, 190.) An analogous partition of waters appears to form, near Jaghederpoor, that extraordinary communication between two great rivers of Indostan, the Mahanuddy and the Godavery. Mr. Bowdich has recently announced, in the account of his *Journey to the Ashantees* (p. 187, 484), a double bifurcation of the Niger, according

confine myself to the mention of an hydraulic phenomenon, which the fine maps of Norway by Baron Hermelin have made known in the greatest detail. A branch of the river Torneo, in Lapland, (the Târendo-Elf) runs to the Calix-Elf, which forms a little separate hydraulic system. This Cassiquiare of the northern zone is only ten or twelve leagues long, but it makes a real river island of all the land in the vicinity of the gulf of Bothnia. We learn from Mr. von Buch †, that the existence of this natural canal was long denied, as obstinately as that of a branch of the Oroonoko flowing into the basin of the Amazon. Another bifurcation, more interesting on account of the ancient communication between the nations of Latium and Etruria, appears to have taken place formerly near the

to which the Quolla must communicate with the Rio Congo or Zaire. This traveller thinks, that a branch of the Quolla runs toward the south-west, under the name of the Ogooawai; and that this Ogooawai, near Adjoomba, divides itself anew, forming on the west the river Assazee, which flows into the sea near Cape Lopez, and on the east, near Tanyan, a tributary stream of the Congo.

† *Voyage en Norwège*, vol. 2, p. 237. The south of France furnishes, but at a little distance only from the Mediterranean, an example of bifurcation similar to those of the Cassiquiare and the Conorichite. See, on the great map of Cassini, the extraordinary interbranchings between the Sorgue, the Louveze, and the river Vesque, near Avignon and Monteux.

lake of Thrasimene. The Arno, in the celebrated *voltata* which it makes toward the south, the west, and the north, between Ribiero and Ponta Sieve, divided itself near the Arazzo into two branches, one of which went to the sea by Florence and Pisa, as at present; and the other, after having followed the Val de Chiana, mingled it's waters with the Tiber, either immediately, or after having confounded them with those of the Paglia. Mr. Fossombroni has shown how in the middle ages, from the effect of deposits of earth from the river, a point of partition was formed in the Val de Chiana; and how the northern part of the *Arno Teverin* now flows (on a counterslope) from south to north, from the little lakes of Montepulciano into the Arno*. The classical soil of Italy contains then, among so many prodigies of nature and of art, one of those bifurcations, of which the forests of the New World display another example on a much larger scale.

I have been often asked since my return from the Oroonoko, whether I were inclined to believe, that the channel of the Cassiquiare would be choked up by successive accumulations of earth; and whether I did not think, that the two

* *Carte d'Italie de Bacler Dalbe,* No. 18, 23, 24. *Fossombroni, Memoria idraulica sopra la Val de Chiana,* 1789, p. 17. Prony, on the hydraulic system of Italy, in the *Journal de l'Ecole Polytechnique,* vol. 4, p. 62.

greatest systems of rivers in equinoctial America would in the lapse of ages become entirely distinct. Having prescribed to myself the law of describing facts only, and of comparing what I have learned with certainty of the relation that exists in different countries between the configuration of the ground and the course of the waters, I ought to avoid whatever is merely hypothetical. I shall first observe, that the Cassiquiare, in it's present state, is not, as the poets of Latium express it, *placidus et mitissimus amnis:* it little resembles that *errans languido flumine Cocytus*, for in the greater part of it's course it has the excessive velocity of six or eight feet in a second. It is not therefore to be feared, that it will entirely fill up a bed of several hundred toises in breadth. The existence of this branch of the Upper Oroonoko is too great a phenomenon for the little changes, that we observe on the surface of the Globe, to make it disappear, or even to modify it considerably. We will not deny, that, respecting rivers less broad, and of little velocity, there exists in all running waters a general tendency to diminish their interbranchings, and separate their basins. The most majestic rivers, when we examine the abrupt sides of the distant hills or shores, appear only like small streamlets of water wandering in vallies, which they could not hollow out themselves; and the present state of their bed is

sufficient to remind us of the progressive diminution of the running waters. We every where see ancient traces of branches dried up, and bifurcations * of which scarcely an historical document remains. The different furrows more or less parallel, which compose the beds of the American rivers, and make their waters appear far more ample than they are in reality, gradually change their direction; they grow wider, and are confounded together by the erosion of the longitudinal ridges, by which they are separated. What was at first but a branch, soon becomes the only recipient; and, in streams that have little velocity, the bifurcations or interbranchings between two hydraulic systems disappear in three ways; either the outlet, or *channel of communication*, draws the whole of the *bifurcated river* into it's basin; or the channel is choked up by deposits, where it issues from the principal recipient; or, finally, in the midst of it's course it forms a transverse ridge, a point of partition, which gives a counter-slope † to the upper part, and occasions the waters to flow back in an opposite direction. Very low countries subject to great periodical inundations, like

* Those of the Gihon (*Ritter*, Geogr., vol. 2, p. 665—693), and of the Nile, near the opening of Fayoum (*Rozière, Const. phys. de l'Egypte*, p. 32—53; *Girard, Vallée de l'Egypte*, p. 4).

† This is at present the case in the Arno Teverin, between Chiusi and Citta della Pieve in the Val de Chiana.

Guyana in America, and Dar-Saley, or Baghermi *, in Africa, suggest to us how much the communications by natural channels may have been heretofore more frequent than at present †.

After having considered the bifurcation of the Oroonoko in relation to *comparative hydrography*, it remains for me to relate succinctly the history of the discovery of this extraordinary phenomenon. The same thing has happened with respect to the communication of two great systems of rivers, as to the course of the Niger toward the east. It required, that a discovery should be repeatedly made, which appeared at first contrary to analogy and received hypotheses. When travellers had recognized the mode of communication between the Oroonoko and the Amazon, the possibility of the fact was still repeatedly called in question. A chain of mountains, which the geographer Hondius had imagined, at the end of the sixteenth century, in order to separate the basins of the rivers, was in

* To the south-east of Bornou and the Lake Nou, in that part of Soudan, where, according to the latest ideas acquired by my unfortunate friend, Mr. Ritchie, the Niger receives the Shary, and falls into the White Nile.

† On the communications that still exist temporarily, at the time of great rains, between the basin of the river St. Lawrence and that of the Mississippi, see chap. xvi, vol. iv, p. 151; and on the inundation of a ravin, by means of which a monk of Choco has joined the South Sea to the Atlantic Ocean, see my Political Essay, vol. 1, p. 25.

turn admitted and denied. It was forgotten, that these mountains, even if they existed, did not prove in an absolute manner the separation of the hydraulic systems; and that the waters have opened passages even across the Cordilleras of the Andes, and the chain of Himalaya *, the most elevated in the known world. It was affirmed, and not without reason, that voyages, which had been said to have been performed in the same boat, did not prove, that the navigation had not been interrupted by *portages* †. I have been fortunate enough, to verify myself all the circumstances of this long contested bifurcation; but I am far from blaming such of the learned, as, guided by a noble zeal in the research of truth, have hesitated to admit what did not appear to them sufficiently clear.

The river of Amazons having been frequented by the Portugueze and the Spaniards,

* The Sutledge, the Gogra, the Gunduk, the Arun, the Teesla, and the Boorampooter, pass through transverse valleys, that is, perpendicular to the great axis of the Himalaya chain. All these rivers consequently break the chain, as the Amazon, the Paute, and the Pastaza, break the Cordillera of the Andes. (See above, chap. 20, p. 41.)

† The same doubts on the existence of some *portages*, where other geographers suppose a communication by water, have been recently brought forward with respect to the problematic communication of the Niger with the Nile; and what is still more extraordinary, with respect to Behring's Strait, and the voyage of the Cossack Deschnew.

long before the Upper Oroonoko was known to these rival nations, the first vague ideas of the communications between these two rivers came to Europe from the mouth of the Rio Negro. The *Conquistadores*, and several historians, as Herera, Fray Pedro Simon, and Father Garcia*, confound the Oroonoko and the Maragnon under the names of the *Rio Grande* and *Mar Dulce* (Great River, Sea of fresh water). The name of the former river is not even found on the famous map of America by Diego Ribero, constructed in 1529. The expeditions of Orellana (1540), and of Lopez de Aguirre (1560), furnish no information with regard to the bifurcation of the Oroonoko; but the rapidity with which Aguirre arrived at the island of la Margaretta had long led to the belief, that, instead of going out by one of the great mouths of the Amazon, he had reached the sea by some interior communication between the rivers †. This hypo-

* Fray Gregorio Garcia (*Origen de los Indios, Valencia*, 1607, p. 165) relates, that he learned from a monk, who had the misfortune of being obliged to follow Pedro de Ursua and the tyrant Lopez de Aguirre, that the Maragnon, after having crossed the great plains (*Llanos*) of Dorado and the Amazons, flows into the sea opposite the islands of Margaretta and Trinidad. (See also *Herera*, vol. i, c. viii, p. 14; and *Fr. Pedro Simon*, vol. 2, ch. vii.)

† See vol. ii, p. 220; vol. iv, p. 192, 257; and p. 323, of the present volume.

thesis was maintained by the Jesuit Acunha: but it is little conformable to the results of the researches, which I have made in the works of the first historians of the conquest *. Acunha as-

* *Acunha. Nuevo Diseubrimiento del Rio de las Amazonas, Madrid*, 1614. The comparison (p. 32) of the distance from the Oroonoko and La Boca de Dragos to the mouths of the Rio Felipe and the Maragnon would seem to prove, that Acunha places the Rio de Felipe a little to the north-west of the North Cape; while in another place (p 2) he says, that Aguirre went from the Maragnon by "a branch opposite the island of Trinidad." Ancient geographers are extremely confused on all that relates to the coast between Point Tigioca and Cape Orange, as is proved by the name of North Cape, given to Cape Orange (*Laet, Nov. Orbis*, p. 636) and the position of the Rio Vicente Pinson, which led the diplomatic body into error at the conclusion of the peace of Utrecht. It appears to me by no means probable, that Aguirre went out beyond the North Cape by the interbranchings of the *estères*, which exist between the Amazon (below Macapa); the Araguari, and the Matario. I should rather think (Gumilla, vol. v, p 43), that Acunha meant to denote by the name of Rio Felipe the northernmost mouth of the Amazon, that which lies between the western point of the island of Caviana and North Cape. The new maps of the hydrographic depot of Rio Janeiro call this mouth the channel of Braganza. The first *conquistadores* had called the little river Meary or Mearim, situate a hundred leagues south-east of the mouth of the Amazon, Maragnon (Maranhao). See, on the geographical error, which gave rise to this denomination of the river, and of all the adjacent province, the *Corogr. Bras.*, vol. ii, p. 251, 253, 260. The opinion of the ancient geographers, who considered the Oronooko, the Amazon or Orel-

serts with simplicity, " that God would scarcely have permitted a tyrant to be successful, and make the fine discovery of the mouth of the Maragnon." He supposes, that Aguirre reached the sea by the Rio de Felipe, which " lies some leagues distant from North Cape."

Raleigh, in different voyages performed by himself, or at his expense*, learned nothing of an hydraulic communication between the Oroonoko and the Amazon; but Keymis, his lieutenant, who from flattery (and particularly in imitation of the name of Orellana given to the Maragnon) designates the Oroonoko under the name of *Raleana*, was the first who had a vague idea of the portages between the Essequibo, the Caroni, and the Rio Branco, or Parima†. These portages were by him converted into a great salt lake; and thus they appear in the map constructed in 1599 from the narratives of Raleigh. A Cordillera is figured between the Oroonoko and the Amazon; and, omitting the bifurcation which exists, Hondius indicates another altogether imaginary; making the Amazon com-

lana, and the Meary or Maranhao, as the same river, was founded on an imperfect knowledge of the mouths of these three rivers, and not on hypotheses of interior communications.

* Cayley's Life of Sir Walter Raleigh, vol. i, p. 152, 227, 229, 263, 276; and vol. ii, p. 103, 118.

† *Ibid.*, vol. 1, p. 232, 236, 251, 283.

municate (by the Rio Tocantines) with the Parana and the river of San Francisco. This communication was retained on the maps for more than a century, as well as a pretended bifurcation of the Rio Magdalena, of which one branch was made to extend to the gulf of Maracaybo.

In 1639, the Jesuits Christoval de Acunha and Andres de Artedia made the journey from Quito to Grand Para in the suite of captain Teixeira; at the confluence of the Rio Negro with the Amazon they learned, "that the former river (called *Curiguacura*, or *Uruna*, by the natives, on account of it's brown tint and limpid waters) sends a branch to the *Rio Grande**, which runs into the North Sea, and the mouth of which is surrounded by Dutch settlements." Acunha advises, to construct a fortress, "not at the confluence of the Rio Negro with the Amazon, but where the branch of communication

* "Los primeros Indios que pueblan un brazo que el Rio Negro aroja, por donde segun informacion se viene salir al Rio Grande, en cuya boca en el mar del Norte estan los Olandeses, son los Guaranaquazanas." (*Acunha*, p. 32.) Lower down, this traveller says, that the fort ought to be placed, "en el brazo que desemboca al Rio Grande que desagua al Oceano, el qual brazo no es en ninguna manera el Orinoco." He places the Rio Felipe "algunas leguas despues del Cabo del Norte." This is all that is found in the original edition of the voyage of Acunha, on a point sufficiently important to the history of geography. Teixeira went up the Amazon, accompanied by two thousand Indians.

breaks off." He discusses what the Rio Grande may be; and he concludes, that it certainly is not the Oroonoko, but perhaps the *Rio Dulce* or the *Rio de Felipe*, that by which Aguirre reached the sea*. Acunha inclines to the last

* I doubt if Acunha had himself a precise idea of what he calls *Rio Dulce* and *Rio Felipe*, when distinguishing the latter from the principal mouth of the Amazon. Vicente Pinzon, coming in the year 1500 from the mouth of the Maragnon to the coast of Paria, had given the name of *Rio Dulce* to the mouth of a river, "near which, at twenty leagues from the coast, he took in water." Herera (vol. i. sec. i, p. 108) believes it to be a branch of the Yuyapari, or Oroonoko: I rather think it is the Oroonoko itself. But what river is that, which the Dutch call *Rio Dulce*, or *Felipe Hadias*? (*Southey*, vol. i, p. 602). Of this I am ignorant. The very rare map of Paulo di Forlani of Verona (*la Descrittione di tutto il Peru*) preserved in the King's Library at Paris, number 457, gives the Maragnon, the Oregliana, the Rio Dulce, and the Rio Viaparo, from south to north, as so many independant rivers. The first is, from it's situation, the Rio Meary of the province of Maranham, to which is given the length of the course of the Amazon, such as it was laid down by Orellana in 1540. The second is indicated as a very small river, although, judging from the latitude, it is the real river of the Amazons, of which Pinzon discovered the mouths in 1500; and which, as Mr. Southey has fully proved, then took the name of the Maranon, long before the expedition of Aguirre. The third river appears to be the Marony (Marowine, Maraveni, Marwyne), or the great river of Essequibo; finally, the fourth, the Viaparo, it cannot be doubted, is the Oroonoko. The geographer De l'Isle indicates a river near Cape Orange, "which must

of these suppositions. We must distinguish, in notions of this kind, what travellers have learned from Indians at the mouth of the Rio Negro, and what they have themselves added from the hypotheses furnished by the state of geography in the age in which they lived. A branch that issues from the Rio Negro is supposed to run into a great river, which flows into the North Sea, on a coast inhabited by *red-haired men*; for it is thus the natives, accustomed only to see *white men* with *black or brown hair* (Portugueze or Spanish), designate the Dutch. Now from the confluence of the Rio Negro with the Amazon, as far as *Canno* Pimichin, by which I entered the former of these rivers, we are at present acquainted with all the tributary streams on the north and the east; and there is but one, the Cassiquiare, which communicates with another river. The sources of the Rio Branco are

communicate with the Amazon," and by which the tyrant Aguirre might have gone out. This river he calls Arcoa. I find it to be the Aracow of Sanson, and the Aracawa of d'Anville, between the Cassipour and the Oyapoc (Wiapoco of the ancient geographers). It is probable, that the note of De l'Isle was meant to refer to the Oyapoc, a considerable river, to which extraordinary branchings were erroneously attributed. Acunha (p. 21, § 44) believes in several communications between the mouth of the Amazon and the rivers, that throw themselves into the sea west of North Cape; and he calls the Rio de Felipe "*una boca transversal del Rio de las Amazonas.*"

traced very minutely on the new maps in the hydrographic depot of Brazil: and we know, that this river communicates by no lake with the Rio Carony, the Essequibo, or any other stream of the coast of Surinam or of Cayenne. A lofty chain of mountains, that of the Pacaraymo, separates the sources of the Paraguamusi (a tributary stream of the Carony) from those of the Rio Branco, as Don Antonio Santos recognized in 1775, in his voyage from Angostura to Grand Para*. South of the chain of Pacaraymo and of Quimiropaca, there is a portage of three days between the Sarauri (a branch of the Rio Branco) and the Rupunuri (a branch of the Essequibo). This was the portage traversed in 1739 by the surgeon Nicholas Hortsmann, a native of Hildersheim, whose journal I have had in my possession; and this was the way also by which don Francisco Jose Rodriguez Barata, lieutenant colonel of the 1st regiment of the line of Para, went twice from the Amazon to Surinam on affairs of his government in 1793. Still more recently, in the month of February, 1811, some English and Dutch colonists arrived at the portage of Rupunuri, to solicit from the commander of the Rio Negro permission to proceed to the Rio Branco; and the commandant

* Manuscript journal of Don Nicolas Rodriguez, which I acquired during my stay at the Oroonoko.

having granted their request, these colonists arrived at fort San Joaquim on the Rio Branco in their boats*. We shall have to speak hereafter of this isthmus, or partly mountainous partly marshy ground, where Keymis (the author of the narrative of Raleigh's second voyage) places el Dorado and the great city of Manoa; but which separates, as we now know with certainty, the sources of the Carony, the Rupunuri, and the Rio Branco, three tributary streams of three different systems of rivers, the Oroonoko, the Essequibo, and the Rio Negro, or the Amazon.

It results from what has been observed, that the natives, who talked to Teixeira and Acunha of the communication of two great rivers, deceived themselves on the direction of the waters of the Cassiquiare, or that Acunha misinterpreted their words. The latter supposition is so much the more probable, as in making use of an interpreter, like the Spanish traveller, I often experienced myself how easy it is to mistake respecting branches which a river sends forth or receives; or, on the direction of a tributary stream which follows the Sun, or which moves in "opposition to the Sun." I suspect the

* Manuscript notes, that were obligingly communicated to me by the Chevalier de Brito, ambassador from Portugal at Paris in 1817.

Indians meant to tell Acunha of communications which might take place with the Dutch possessions by portages from the Rio Branco to the Rio Essequibo. The Caribbees, no doubt, reached the banks of the Rio Negro both ways, by the isthmus of Rupunuri, and by the Cassiquiare; but an uninterrupted communication of rivers must have appeared to the natives an object more adapted to fix the attention of strangers; and if the mouth of the Oroonoko be not found, properly speaking, in the Dutch possessions, it is at least extremely near them. The abode of Acunha at the confluence of the Rio Negro not only procured to Europe the first knowledge of the communication between the Amazon and the Oroonoko, but had also results advantageous to humanity. The troop of Teixeira wanted to force it's commander to enter the Rio Negro, in order to carry off slaves. The two monks, Acunha and Artedia, protested in writing against this unjust and impolitic expedition. They maintained at the same time a principle somewhat strange, that "conscience did not permit Christians to drag into slavery any natives, but such as were to serve as interpreters." Whatever may be thought of this axiom, the noble and courageous protest of the two monks caused the failure of the projected enterprise*.

* Acunha, p. 34, § 67.

The geographer Sanson traced a map of the Oroonoko and the Amazon, in 1680, from the narrative of the voyage of Acunha. This map was with respect to the Amazon, what the map of Gumilla was during a long time for the Lower Oroonoko. In the part which extends north of the equator it is merely hypothetical, and figures, as we have observed above, the bifurcation of the Caqueta at a right angle. One of the branches of the Caqueta is the Oroonoko, the other the Rio Negro. Thus Sanson thought he could combine in this map, and in another of all South America, published in 1656, the vague notions that Acunha had acquired in 1639, respecting the branchings of the Caqueta*, and the communications of the Amazon with the Oroonoko. The erroneous idea, that the Rio Negro issues from the Oroonoko, or from the Caqueta, of which the Oroonoko is but a branch, was retained† till near the middle of the seventeenth century, the period when the Cassiquiare was discovered.

Father Fritz, who went to Quito with ano-

* "El grande Rio Caqueta," says Acunha (*Nuevo Descubr.*, p. 21, § 45), "tiene muchos brazos; el mas meridional va al Rio de las Amazonas, pero el que mas se inclina a la *vanda del Norte* es el Rio por el qual el Capitan Fernan Perez de Quesada se dexava llevar a la parte de Santa Fe y la Provincia del Algodonal."

† See above, p. 322.

ther German jesuit, traced a map* of the Amazon in 1690, the best that had been made before the voyage of M. de la Condamine. This map guided the French academician in his navigation, as the ancient maps of La Cruz and Caulin guided me on the Oroonoko. It seems surprising, that father Fritz, notwithstanding his long residence on the banks of the Amazon, (having been detained a prisoner two years by the commander of a Portugueze fort), had not acquired any notion of the Cassiquiare. The historical illustrations, which he has inserted in the margin of his manuscript map, and which I have recently examined with care, are imperfect, and but few. He makes a chain of mountains† pass between two systems of rivers, and contents himself with bringing one of the branches, which give birth to the Rio Negro, near

* It was not sent to Europe till 1707; and was published only in 1717, in the fine collection of the *Lettres Edifiantes*.

† That chain of mountains, of which there is no trace in nature (I speak as an eye witness), south of the Oroonoko, between San Fernando de Atabapo and the Cassiquiare, appeared again in the thirteenth article of the preliminary treaty of peace and boundaries, October the 1st, 1777. We have had occasion to observe above, that the diplomatic body do not always consult geographers, and that errors of situation, which we are willing to believe involuntary, have become, since the eighth article of the peace of Utretcht, a source of disputes incessantly reviving with respect to the limits of French and Portugueze Guyana.

a tributary stream of the Oroonoko, which from it's situation appears to be the Rio Caura. Every thing remained uncertain during the space of a century, which separates the voyage of Acunha from the discovery of the Cassiquiare by father Roman.

The communication of the Oroonoko with the Amazon by the Rio Negro, and a bifurcation of the Caqueta, imagined by Sanson, and rejected by father Fritz and by Bleauw, reappeared in the first maps of De l'Isle; but were abandoned by that celebrated geographer toward the end of his days*. Those who had mistaken the mode of this communication hastened to deny the communication itself. It is in fact well worthy of remark, that, at the time when the Portugueze went up most frequently by the Amazon, the Rio Negro, and the Cassiquiare†, and when father Gumilla's letters were carried (by the natural interbranching of the rivers) from the lower Oroonoko to Grand Para, this very missionary makes every effort to spread the opinion through Europe, that the basins of the Oroonoko and the Amazon are perfectly separate. He asserts‡, that, having several times gone up

* See above, p. 327, note†, 328 note*.

† From 1737 to 1740.

‡ *Orinoco illustr.*, vol. 1, p. 41. I conclude from a passage in vol. i, p. 367, that this work, published in 1741, was written in 1739. It is therefore by mistake, as we have observed before, that the *Licencias* of the censor are dated in 1731.

the former of these rivers as far as the Raudal of Tabaje, situate in the latitude of 1° 4′, he never saw a river flow in or out, that could be taken for the Rio Negro. He adds farther, that " a great Cordillera*, which stretches from east to west, prevents the mingling of the waters, and renders all discussion on the pretended communication of the two rivers useless." The errors of father Gumilla arise from his firm persuasion, that he had reached the parallel of 1° 4′ on the Oroonoko. He deceived himself† by more than 5° 10′ of latitude; for I found by observation at the mission of Atures, thirteen leagues south of the rapids of Tabaje, the latitude to be 5° 37′ 34″. Gumilla having gone but little above the confluence of the Meta, it is not surprising, that he had no knowledge of the bifurcation of the Oroonoko, which is found by the sinuosities of the river to be one hundred and

* Father Caulin, who wrote in 1759, although his accurate and very useful book (*Historia corografica de la Nueva Andalusia y vertientes del Rio Orinoco*) appeared only in 1779, has combated with great discernment the idea of a chain of mountains, that prevents all communication between the basins of the Oroonoko and the Amazon. "The error of father Gumilla," says he, (libro i, cap. 10, p. 79), " consists in the supposition of a Cordillera, which, uninterrupted, and like an immense wall, stretches from the frontiers of New Granada to the coasts of Cayenne. He forgets that chains of mountains are often divided by deep (transversal) vallies, when, seen from afar, they appear *contiguas ò indivisas*."

† See vol. iv, p. 569.

twenty leagues distant from the Raudal of Tabaje. This missionary, who resided on the banks of the Oroonoko three years (not thirty, as his translators pretend), should have confined himself to the relation of what he had seen with his own eyes in navigating on the Apure, the Meta, and the Oroonoko, from Guayana Vieja as far as the neighbourhood of the first great cataract. The admiration his work at first excited, the only one which had appeared on those countries before the works of father Caulin and Gili, was succeeded by too marked a disdain in the Spanish colonies. The *Orinoco illustrado* does not indeed display that intimate knowledge of localities, or that candid simplicity, which gives a certain charm to the narratives of the missionaries; there is some affectation in the style, and a constant tendency to exaggeration; but, notwithstanding these defects, father Gumilla's book contains many just observations on the manners and natural dispositions of the different tribes of the Lower Oroonoko and the Llanos of Casanare.

M. de la Condamine*, during his memorable navigation on the river of Amazons in 1743, carefully collected a great number of proofs of this communication of the rivers, denied by the Spanish jesuit. The most decisive proof then

* Voyage to the Amazon, p. 119.

appeared to him to be the unsuspected testimony of a Cauriacani Indian woman, with whom he had conversed, and who had come in a boat from the banks of the Oroonoko (from the mission of Pararuma*) to Grand Para. Before the return of M. de la Condamine to his own country, the voyage of father Manuel Roman, and the fortuitous meeting of the missionaries of the Oroonoko and the Amazon, left no doubt of this fact, of which Acunha first obtained the knowledge.

The incursions undertaken from the middle of the seventeenth century, to procure slaves, had gradually led the Portugueze from the Rio Negro, by the Cassiquiare, to the bed of a great river, which they did not know to be the Upper Oroonoko. A flying camp, composed of the *troop of ransomers*†, favoured this inhuman commerce. After having excited the natives to make war, they *ransomed* the prisoners; and, to give an appearance of equity to the *trade*, monks accompanied the *troop of ransomers*, to examine "whether those who sold the slaves had a right to do so, by having made them prisoners in open war." From the year 1737, these voyages of the Portugueze to the Upper Oroonoko became very frequent. The desire of exchanging

* See above, chap. 19, vol. iv, p. 537.

† *Tropa de rescate*; from *rescatar*, redimere.

slaves (*poitos*) for hatchets, fish-hooks, and glass trinkets, induced the Indian tribes to make war upon one another. The Guipunaves, led on by their valiant and cruel chief, Macapu, descended from the banks of the Inirida toward the confluence of the Atabapo and the Oroonoko. "They sold," says the missionary Gili, "the slaves whom they did not eat*." The jesuits of the Lower Oroonoko became uneasy at this state of things, and the superior of the Spanish missions, father Roman, the intimate friend of Gumilla, took the courageous resolution of crossing the Great Cataracts, and visiting the Guipunaves, without being escorted by Spanish soldiers. He left Carichana the 4th of February, 1744; and having arrived at the confluence of the Guaviare, the Atabapo, and the Oroonoko, where the last mentioned river suddenly changes it's course from east to west, to a direction from south to north, he saw from afar a canoe as large as his own, and filled with men in European dresses. He caused a crucifix to be placed at the bow of his boat in sign of peace, according to the custom of the missionaries when they navigate in a country unknown to them. The

* "J. Guipunavi avventizj abitatori dell' Alto Orinoco, recavan de' danni incredibili alle vicine mansuete nazioni; altre mangiandone, altre conducendone schiave ne' Portoghesi dominj." (*Gili*, tom. i, p. 31.) See also above, chap. xxii, p. 208.

whites, who were Portugueze slave-traders of the Rio Negro, recognized with marks of joy the habit of the order of saint Ignatius. They heard with astonishment, that the river, on which this interview took place, was the Oroonoko; and they brought father Roman by the Cassiquiare to the Brazilian Settlements on the Rio Negro. The superiour of the Spanish missions was forced to remain near the flying camp of the *troop of ransomers*, till the arrival of the Portugueze jesuit Avogadri, who was gone upon business to Grand Para. Father Manuel Roman returned with his Saliva Indians by the same way, that of the Cassiquiare and the Upper Oroonoko, to Pararuma*, a little to the north of Carichana, after an absence of seven months. He was the first white man, who went from the Rio Negro, consequently from the basin of the

* The 15th of October, 1774. M. de la Condamine quitted the town of Grand Para December the 29th, 1743; it follows from a comparison of the dates, which I gave in the historical sketch of the discoveries in Guyana, that the Indian woman of Pararuma, carried off by the Portugueze, and to whom the French traveller had spoken, had not come with father Roman, as was erroneously affirmed. The appearance of this woman on the banks of the Amazon is interesting with respect to the researches lately made on the mixture of races and languages; it proves the enormous distances, at which the individuals of one tribe are compelled to mix with those of another.

Amazon, without passing his boats over any portage, to the basin of the Lower Oroonoko.

The tidings of this extraordinary voyage were spread with such rapidity, that M. de la Condamine was able to proclaim them*, at a public sitting of the Academy, seven months after the return of father Roman to Pararuma. "The communication between the Oroonoko and the Amazon," said he, "recently averred, may pass so much the more for a discovery in geography, as, although the junction of these two rivers is marked on the ancient maps (according to the information given by Acunha), it had been suppressed by all the modern geographers, in their new maps, as if in concert. It is not the first time, that what is positive fact has been thought fabulous, that the spirit of criticism has been pushed too far, and that this communication has been treated as chimerical by those, who ought to have been better informed." Since the voyage of father Roman in 1774, no person in Spanish Guyana, or on the coasts of Cumana and Caraccas, has longer admitted a doubt of the existence of the Cassiquiare and the bifurcation

* They had been communicated to him by father John Ferreyro, rector of the college of jesuits at Para. *Voy. à l'Amazone*, p. 120. *Mém. de l'Académie*, 1745, p. 450. *Caulin*, p. 79. See also, in the work of Gili, the fifth chapter of the first book, published in 1780, with the title ; Delta scoperta delle communicazione dell' Orinoco col Maragnone, vol. i, p. 31 to 34.

of the Oroonoko. Father Gumilla himself, whom Bouguer met at Carthagena, confessed that he had been deceived; and he read to father Gili, a short time before his death, a supplement to his history of the Oroonoko, intended for a new edition, in which he recounts gaily* the manner in which he had been undeceived. The expedition of the boundaries, under Iturriaga and Solano, completed in great detail the knowledge of the geography of the Upper Oroonoko, and the intertwinings of this river with the Rio Negro. Solano established himself in 1756 at the confluence of the Atabapo; and from that time the Spanish and Portugueze commissioners often passed in their canoes, by the Cassiquiare, from the Lower Oroonoko to the Rio Negro, to visit each other at their headquarters of Cabruta † and Mariva‡. Since

* *Lepidamente, al suo solito,* says the missionary Gili.

† General Iturriaga, confined by illness, first at Muitaco, or Real Corona, and afterward at Cabruta, received a visit in 1760 from the Portugueze colonel don Gabriel de Sousa y Figueira, who came from Grand Para, having made a voyage of nearly nine hundred leagues in his boat. The Swedish botanist, Loefling, who was chosen to accompany the expedition of the boundaries at the expense of the Spanish government, multiplied in his ardent imagination to such a point the branchings of the great rivers of South America, that he appeared well persuaded of being able to navigate by the Rio Negro and the Amazon to the Rio de la Plata. (*Iter*, p. 131.)

‡ This place, called Marioba and Mariova by d'Anville

the year 1767, two or three canoes come annually from the fort of San Carlos, by the bifurcation of the Oroonoko, to Angostura, to fetch salt and the pay of the troops. These voyages, from one basin of a river to another, by the natural canal of the Cassiquiare, excite no more attention in the colonists at present, than the arrival of boats, that descend the Loire by the canal of Orleans, awakens on the banks of the Seine.

Although since the voyage of father Roman, in 1744, precise notions have been acquired in the Spanish possessions in America, both of the direction of the Upper Oroonoko from east to west, and of the manner of it's communication with the Rio Negro, this knowledge did not reach Europe till a much later period. In 1750, La Condamine and D'Anville* still admitted, that the Oroonoko

and La Cruz, is no longer found on the new maps of the Rio Negro constructed at the hydrographic depot of Rio Janeiro. Mr. Apollinario Diez de la Fuente, in a manuscript journal of which I am in possession, calls it Maribaes, military head-quarters. It is no doubt, the ancient *Barcelos*, between the town of Thomar and the great mouth of the Rio Branco.

* See the classical memoir of this great geographer in the *Journal des Savans*, March, 1750, p. 184. "One fact," says d'Anville, "which cannot be considered as equivocal, after the proofs with which we have been recently furnished, is the communication of the Rio Negro with the Oroonoko;

was a branch of the Caqueta coming from the south-east, and that the Rio Negro issued immediately from it. It was in the second edition* only of his *South America*, that D'Anville, without renouncing that intercommunication of the Caqueta, by means of the Iniricha (Inirida), with the Oroonoko and the Rio Negro, makes the Oroonoko take it's rise at the east, near the sources of the Rio Branco, and marks the Rio Cassiquiare as bearing the waters of the Upper Oroonoko to the Rio Negro. It is probable, that this indefatigable and learned writer had obtained information on the manner of the bifurcation from his frequent communications with

but we must not be ashamed to admit, that we are not yet sufficiently informed of the manner, in which this communication takes place." I was surprised to see in a very rare map, which I found at Rome (*Provincia Quitensis Soc. Jesu in America, auctore Carolo Brentano et Nicolao de la Torre; Romæ*, 1745), that seven years after the discovery of father Roman, the jesuits of Quito were ignorant of the existence of the Cassiquiare. The Rio Negro is figured in this map as a branch of the Oroonoko.

* Probably of 1760. (*Barbié du Bocage, Not. des Ouvrages de d'Anville*, p. 98.) It is to be regretted, that d'Anville, in making important corrections on the plates of his maps, had not the habit of marking the dates of these changes. Those geographers who are ignorant of this circumstance may be led into error respecting the date of discoveries, which were posterior to the year indicated on the map where they are traced.

the missionaries*, who were then, as they are at present, the only geographers of the most inland parts of the continents. He erred 3·5° of latitude on the confluence of the Cassiquiare with the Rio Negro, but he then indicated with sufficient precision the situation of the Atabapo, and of the woody isthmus by which I passed from Javita to the banks of the Rio Negro. The maps of La Cruz Olmedilla† and of Surville‡,

* According to the annals of Berredo, it would appear, that from the year 1739, the military incursions from the Rio Negro to the Cassiquiare had confirmed the Portugueze jesuits in the opinion, that there was a communication between the Amazon and the Oroonoko. *Southey*, vol. i, p. 658.

† The basis of all the new maps of America has been that of La Cruz. (*Mapo geografico de America meridional por D. Juan de la Cruz Cano y Olmedilla, Geogr. pens. de S. M.*, 1775.) The original edition, which I possess, is the more rare, the plates having been broken, it is commonly believed, by order of a minister of the colonies, who feared, that the map was but too exact. I can affirm, that the map does not merit this reproach, except on a small number of points.

‡ Fray Antonio Caulin, an Observantin monk, accompanied the expedition of Ituriaga and Solano. We see in the ninth chapter of the first book of his *Historia corografico de Nueva Andalucia*, that he had constructed two maps in 1756, one of which comprehended the Lower Oroonoko from it's mouth as far as Atures; and the other, the Upper Oroonoko, the Cassiquiare, and the Rio Negro. He wished to separate what he had verified with his own eyes, from what was only founded on mere report. Surville, availing himself of the two manuscript maps of Caulin, and mingling with

published in 1775 and 1778, together with the work of father Caulin, have best made known the labours of the expedition of the boundaries; for the numerous contradictions, that are found in them, relate to the sources of the Oroonoko and the Rio Branco, and not to the course of the Cassiquiare and the Rio Negro, which they indicate as well as could be required in the absolute want of any astronomical observation.

Such was the state of the hydrographic discoveries in the interior of Guyana, when, a short time before my departure from Europe, a man of science, whose labours have been so useful to the progress of geography, thought fit to make new researches respecting the narrative of Acunha, the map of father Samuel Fritz, and the *America Meridional* of La Cruz Olmedilla. The political state of France had perhaps prevented M. Buache from procuring or examining the works of Caulin and Gili, two missionaries, who resided on the banks of the Oroonoko, when the expedition of the boundaries established the communications, which have been regularly kept up during more than half a century, between the Spanish fort of the Rio Negro and the Town of Angostura, by the Cassiquiare and

them many of his own systematic ideas, constructed in 1778, his *Mapo corografico de la Nueva Andalucia.* This map is very often contradictory to Caulin's book, to which it is annexed.

the Upper Oroonoko. In the *Carte générale de Guyane*, published in 1798, the Cassiquiare, and that part of the Upper Oroonoko situate to the east of Esmeralda, are marked as a tributary river of the Rio Negro, and as not being connected with the Oroonoko. A chain of mountains is made to pass across the plain, that forms the isthmus between the Tuamini and the Pimichin; this chain is supposed to run toward the north-east, and form a point of partition between the waters of the Oroonoko and those of the Rio Negro and the Cassiquiare, twenty leagues west of Esmeralda. In a note added to this map, it is said, that, "the long-supposed communication between the Oroonoko and the Amazon is a monstrous error in geography, which the map of La Cruz has multiplied, without foundation; and that, to rectify the ideas entertained on this point, it is necessary to observe the direction of the great chain, which separates the waters."

I was fortunate enough to reconnoitre this chain on the spot. I passed with my boat in the night of the 24th of May, along that part of the Oroonoko, where Mr. Bauche supposes the bed of the river to be cut by a Cordillera. If there had been *a line of summits*, (a point of partition) on that spot, I should have gone up a river for the first twenty leagues to the west of the Esmeralda, instead of descending, as I

did, favoured by a rapid current. The same river, which rises to the east of that mission, and sends a branch (the Cassiquiare) to the Rio Negro, continues it's course, without interruption, toward Santa Barbara and San Fernando de Atabapo. It is that part of the Upper Oroonoko, which runs from the south-east to the north-west, and which is called Rio Paragua by the Indians. The same river, after having mingled it's waters with those of the Guaviare and the Atabapo, flows toward the north, and passes over the Great Cataracts. All these circumstances are in general well marked in the great map of La Cruz; but M. Buache no doubt supposed, that in the different voyages said to have been performed by water from the Amazon to the Oroonoko, the boats had been dragged over some portage (*arastradero*) from one stream to another. This respectable geographer might be led so much the more readily to admit, that the rivers had not in nature the course prescribed to them in the new Spanish maps, as these very maps display the most singular and improbable branchings of confluent streams around lake Parima (that pretended *White Sea* six hundred leagues square). We might apply to the Oroonoko what father Acunha said of the Amazon, when describing it's marvels, " nacieron hermanadas

en las cosas grandes la novedad y el descredito*."

Had the nations of the lower region of equinoxial America participated in the civilization spread over the cold and alpine region, that immense Mesopotamia between the Oroonoko and the Amazon would have favored the development of their industry, animated their commerce, and accelerated the progress of social order. We see every where in the ancient world the influence of locality on the dawning civilization of nations†. The island of Meroe between the Astaboras and the Nile, the Punjab of the Indus, the Duab of the Ganges, and the Mesopotamia of the Euphrates, furnish examples, that are justly celebrated in the annals of the human race. But the feeble tribes, that wander in the savannahs and the woods of eastern America, have little profited from the advantages of their soil, and the interbranchings of their rivers. The distant incursions of the Caribbees, who went up the Oroonoko, the Cassiquiare, and the Rio Negro, to carry off slaves and exercise pillage, compelled some rude tribes to rouse themselves from their indolence, and form associations for their common defence;

* "In great objects" (in the extraordinary phenomena of nature) "novelty always excites mistrust."

† *Ritter, Erdkunde*, vol. i, p. 181.

the little good, however, which these wars with the Caribbees (the Bedoueens of the rivers of Guyana) produced, was a slight compensation for the evils that followed in their train, by rendering the manners of the tribes more ferocious, and diminishing their population. We cannot doubt, that the physical aspect of Greece, intersected by small chains of mountains, and mediterranean gulfs, contributed at the dawn of civilization to the intellectual development of the Greeks. But the action of this influence of climate, and of the configuration of the soil, is felt in all it's force only among a race of men, who, endowed with a happy disposition of the mental faculties, receive some exterior impulse. In studying the history of our species, we see, at certain distances, these foci of ancient civilization dispersed over the Globe like luminous points; and we are struck by the inequality of improvement in nations inhabiting analogous climates, and whose native soil appears equally favoured by the most precious gifts of nature.

Since my departure from the banks of the Oroonoko and the Amazon, a new era unfolds itself in the social state of the nations of the West. The fury of civil discussions will be succeeded by the blessings of peace, and a freer development of the arts of industry. The bifurcation of the Oroonoko, the isthmus of Tuamini, so easy to

pass over by an artificial canal, will fix the attention of commercial Europe. The Cassiquiare, as broad as the Rhine, and the course of which is one hundred and eighty miles in length, will no longer form in vain a navigable canal between two basins of rivers, which have a surface of one hundred and ninety thousand square leagues. The grain of New Grenada will be carried to the banks of the Rio Negro; boats will descend from the sources of the Napo and the Ucuyabe, from the Andes of Quito and of Upper Peru, to the mouths of the Oroonoko, a distance which equals that from Tombuctoo to Marseilles. A country nine or ten times larger than Spain, and enriched with the most varied productions, is navigable in every direction, by the medium of the natural canal of the Cassiquiare, and the bifurcation of the rivers. This phenomenon, which will one day be so important for the political connections of nations, unquestionably deserved to be carefully examined.

CHAPTER XXIV.

The Upper Oroonoko, from Esmeralda to the confluence of the Guaviare.—Second passage across the Cataracts of Atures and Maypures.—Lower Oroonoko between the mouth of the Rio Apure and Angostura, the capital of Spanish Guyana.

It remains for me to speak of the most solitary and remote Christian settlement on the Upper Oroonoko. Opposite the point where the bifurcation takes place, the granitic group of Duida rises in an amphitheatre on the right bank of the river. This mountain, which the missionaries call a volcano, is nearly 8000 feet high. Perpendicular on the south and the west, it has an aspect of solemn greatness; it's summit is bare and stony, but, wherever it's less steep declivities are covered with mould, vast forests appear suspended on it's flanks. At the foot of Duida is placed the mission of Esmeralda, a little hamlet with eighty inhabitants, surrounded by a lovely plain, bathed by rills of black, but limpid

waters. This is a real meadow, decorated with clumps of the mauritia palm, which is the sago-tree of America. Nearer the mountain, the distance of which from the Cross of the mission I found to be 7300 toises, the marshy plain changes to a savannah, and spends itself along the lower region of the Cordillera. Large pine-apples are there found of a delicious flavour; that species of bromelia always grows solitary among the gramina* like our colchicum autumnale, while the karatas, another species of the same genus, is a *social* plant, like our whortles and heaths. The pine-apples of Esmeralda are cultivated throughout Guyana. There are certain spots in America, as in Europe, where different fruits attain their highest degree of perfection. The sapota plum (achras) should be eaten at the Island of Margaretta or at Cumana: the chilimoyas (very different from the custard apple, and sweet sop of the West India Islands,) at Loxa, in Peru; the grenadilles, or *parchas,* at Caraccas; and the pine-apple at Esmeralda, or in the island of Cuba; to find no exaggeration in the praises, which the first travellers bestowed on the excellence of the productions of the torrid

* The country round Esmeralda abounds in gramineæ and cyperaceæ; setaria *composita,* paspalum conjugatum, pariana campestris, mariscus *lævis,* juncus *floribundus, elionurus ciliaris,* chœtospora *capitata.*

zone. The pine-apple forms the ornament of the fields near the Havannah, where it is planted in parallel rows; on the sides of the Duida it embellishes the turf of the savannahs, lifting it's yellow fruit, crowned with a bunch of silvery leaves, above the setaria, the paspalum, and a few cyperaceæ. This plant, which the Indians of the Oroonoko call *ana-curua*, has been propagated ever since the sixteenth century in the interior of China *, and some English travellers found it recently, together with other plants indubitably American, (maize, cassava, tobacco, and pimento) on the banks of the Rio Congo, in Africa.

There is no missionary at Esmeralda; the monk, appointed to celebrate mass in that hamlet, is settled at Santa Barbara, more than fifty leagues distant. It requires four days to go up the river; and he therefore visits this spot but five or six times in a year. We were cordially received by an old officer, who took us for Catalonian shopkeepers, whom our little trade had led to the missions. On seeing packages of paper for the purpose of drying our plants, he smiled at our simple ignorance. "You come,"

* *See* my *Essai polit.*, vol. i, p. 412. No doubt remains of the American origin of the bromelia ananas. *Cayley, Life of Raleigh*, vol. i, p. 61. *Gili*, vol. i, p. 210, 336. *Robert Brown, Geogr. Observ. on the Plants of the Congo*, 1818, p. 50.

said he, " to a country, where this kind of merchandize has no sale; we write little here; and the dried leaves of maize, the *platano* (plantain tree), and the *vijaho* (heliconia), serve us, like paper in Europe, to wrap up needles, fish hooks, and other little articles, of which we are careful." This old officer united in his person the civil and ecclesiastical authority. He taught the children, I will not say the Catechism, but the Rosary; he rang the bells to amuse himself; and, impelled by an ardent zeal for the service of the church, sometimes used his chorister's wand in a manner not very agreeable to the natives.

Notwithstanding the extreme smallness of the mission, three Indian languages are spoken at Esmeralda; the Idapimanare, the Catarapenno, and the Maquiritan. The last of these prevails in the Upper Oroonoko, from the confluence of the Ventuari as far as that of the Padamo*; as the Caribbee does in the Lower Oroonoko; the Otomac, near the confluence of the Apure; the Tumanac and the Maypure, at the Great Cataracts; and the Maravitan, on the banks of the Rio Negro. These are the five, or six lan-

* The Arivirianoes of the banks of the Ventuario speak a dialect of the language of the Maquiritares. The latter live jointly with a tribe of the Macoes in the savannahs, that are traversed by the Padamo. They are so numerous, that they have even given their name to this tributary stream of the Oroonoko. (*See* the great map of La Cruz.)

guages most generally spoken. We were surprized to find at Esmeralda many *zamboes*, mulattoes, and copper-coloured people, who call themselves *Espannoles*, and fancy they are white, because they are not so red as the Indians. These people live in the most absolute want; they have for the most part been sent hither in banishment *(desterrados)*. Solano, in his haste to found colonies in the interior of the country, in order to guard it's entrance against the Portugueze, assembled in the Llanos, and as far as the island of Margaretta, vagabonds and malefactors, whom justice had vainly pursued, and made them go up the Oroonoko to join the unhappy Indians, who had been carried off from the woods. A mineralogical error gave celebrity to Esmeralda. The granites of Duida and Maraguaca contain in open veins fine rock crystals, some of them of great transparency, others coloured by chlorit, or blended with actinote; and they were taken for diamonds and emeralds.

So near the sources of the Oroonoko, we heard of nothing in these mountains but the proximity of El Dorado, the lake Parima, and the ruins of the great city of Manoa. A man, still known in the country for his credulity and his love of exaggeration, don Apollinario Diez de la Fuente, assumed the pompous title of *capitan poblador*, and *cabo militar* of the fort of Cassiquiare. This fort consisted of a few trunks

of trees, joined together by planks; and, to complete the deception, a demand was made at Madrid of the privileges of a *villa* for the mission of Esmeralda, which was but a hamlet with twelve or fifteen huts. It is to be feared, that don Apollinario, who was afterward governor of the province of Los Quixos *, had some influence in the construction of the maps of La Cruz and Surville. Knowing simply the points of the compass, he did not hesitate, in the numerous memoirs which he sent to the court, to style himself the cosmographer of the expedition of the boundaries.

While the chiefs of that expedition were well persuaded of the existence of the *Nueva Villa de Esmeraldas*, and of the mineral riches of the Cerro Duida, which contains only mica, rock-crystal, actinote, and ruthile (titanite), a colony composed of elements altogether heterogeneous, perished by degrees. The vagabonds of the Llanos had as little taste for labour as the natives, who were compelled to live "within the sound of the bell." The former found a motive in their pride, to justify their indolence. In the missions, every mulatto, who is not decidedly black as an African, or copper-coloured as an Indian, calls himself a *Spaniard*; he belongs to the *gente de razon*, the race endued with reason;

* Dependent on the kingdom of Quito.

and that reason, sometimes, it must be admitted, arrogant and indolent, persuaded the whites, and those who fancy they are so, that to till the ground is the task of slaves, of *poitos* and of the native neophytes. The colony of Esmeralda had been founded according to the principles of that of New Holland; but it was far from being governed with the same wisdom. The American colonists, being separated from their native soil, not by seas, but by forests intermixed with savannahs, dispersed; some taking the road to the north, toward the Caura and the Carony; others proceeding south to the Portugueze possessions. Thus the celebrity of this *villa*, and of the emerald mines of Duida, vanished in a few years, and Esmeralda, on account of the immense number of insects that obscure the air at all seasons of the year, was regarded by the monks as a place of banishment and malediction.

I mentioned above, that the superior of the missions, when he would make the lay brothers return to their duty, menaces sometimes to send them to Esmeralda; "that is," say the monks, "to be condemned to *the moschettoes;* to be devoured by those buzzing flies *(zancudos gritones)*, with which God has peopled the earth to chastise man*." Such strange punishments have

* "Estos mosquitos que llaman zancudos gritones que parece los cria la naturaleza para castigo y tormento de los hombres." (*Fray Pedro Simon.* p. 481.)

not always affected solely the lay brothers. There happened in 1788 one of those monastic revolutions, of which it is difficult to form a conception in Europe, according to the ideas that prevail of the peaceful state of the Christian settlements in the New World. During a long time the monks of the order of St. Francis, settled in Guyana, had been desirous of forming a separate republic, and rendering themselves independent of the college of Piritu at Nueva Barcelona. Discontented with the election of Fray Gutierez de Aguilera, chosen by a general chapter, and confirmed by the king in the important office of president of the missions, five or six monks of the Upper Oroonoko, the Cassiquiare, and the Rio Negro, assembled together at San Fernando de Atabapo; chose hastily a new superior from their own body; and caused the old one, who, unfortunately for himself, had come to visit those countries, to be seized. They put him in irons, threw him into a boat, and conducted him to Esmeralda, as to a place of proscription. The great distance of the coast from the theatre of this revolution led the monks to hope, that their crime would remain long unknown beyond the Great Cataracts. They wished to gain time to intrigue, to negotiate, to frame acts of accusation, and employ the little artifices, by which, in every country, the invalidity of a first election is proved. The ancient

superior groaned in his prison at Esmeralda, and fell dangerously ill from the double influence of the excessive heat, and the continual irritation of the *moschettoes*. Happily for fallen power the monks did not remain united. A missionary of the Cassiquiare conceived serious alarms on the issue of this affair; he dreaded being sent a prisoner to Cadiz, or, as they say in the colonies, *baxo partido de registro;* fear made him change his party, and he suddenly disappeared. Indians were placed on the watch at the mouth of the Atabapo, at the Great Cataracts, and wherever the fugitive was likely to pass in order to reach the Lower Oroonoko. Notwithstanding these precautions, he arrived at Angostura, and thence reached the college of the missions of Piritu; denounced his colleagues; and was appointed, in recompense of this information, to arrest those with whom he had conspired against the president of the missions*. At Esmeralda, where the political events that have agitated

* Two of the missionaries, considered as the leaders of the insurrection were embarked at Angostura, in order to be tried in Spain. The vessel in which they were conveyed became leaky, and put into Spanish Harbour in the island of Trinidad. The governor Chacon interested himself in the fate of the monks; they were pardoned, a sally of vivacity somewhat contrary to monastic discipline, and were again employed in the missions. I was acquainted with them both during my abode in South America.

Europe for thirty years past have not yet been heard of, a lively interest is still preserved for what is called *el alboroto de los frailes* (the sedition of the monks). In this country, as in the East, no conception is formed of any other revolutions than those that are made by the governors themselves; and we have just seen, that the effects are not very alarming.

If the *villa* of Esmeralda, with a population of twelve or fifteen families, be at present considered as a frightful abode, this must be attributed to the want of cultivation, the distance from every other inhabited country, and the excessive quantity of moschettoes. The site of the mission is highly picturesque; the surrounding country is lovely, and of great fertility. I never saw clusters of plaintains of so large a size as these; and indigo, sugar, and cacao might be produced in abundance, if any trouble were taken for their cultivation. The Cerro Duida is surrounded with fine pasturage; and, if the Observantins of the college of Piritu partook a little of the industry of the Catalonian Capuchins settled on the banks of the Carony, numerous herds would be seen wandering between the Cunucunumo and the Padamo. In the present state of things, not a cow or a horse is to be found; and the inhabitants, victims of their own indolence, are often reduced to eat hams of alouate monkies, and flour of the bones of fish, of which I shall have

occasion to speak hereafter. A little cassava and a few plantains only are cultivated; and when the fishery is not abundant, the natives of a country so favoured by nature are exposed to the most cruel privations.

The pilots of the small number of boats, that go from the Rio Negro to Angostura by the Cassiquiare, being afraid to ascend as far as Esmeralda, this mission would have been much better placed at the point of the bifurcation of the Oroonoko. It is probable, that this vast country will not always be doomed to the desertion in which it has hitherto been left from the errors of monkish administration, and the spirit of monopoly that characterises corporations. We may even predict on what points of the Oroonoko industry and commerce will become most active. In every zone, population is concentred at the mouth of tributary streams. The Rio Apure, by which the productions of the provinces of Varinas and Merida are exported, will give great importance to the little town of Cabruta, which will then be in rivalship with San Fernando de Apure, where all commerce has hitherto centred. Higher up, a new settlement will be formed at the confluence of the Meta, which communicates with New Grenada by the Llanos of Casanare. The two missions of the Cataracts will increase from the activity, to which the transport of oats at those points will

give rise; for, an unhealthy and damp climate, and the excessive abundance of moschettoes, will as little impede the progress of cultivation at the Oroonoko, as at the Rio Magdalena, whenever a powerful mercantile interest shall call new planters thither. Habitual evils are those which are least felt; and men born in America do not suffer the same intensity of pain as Europeans recently arrived. Perhaps also the destruction of forests round the inhabited places, although slow, will a little diminish the cruel torment of the tipulary insects. San Fernando de Atabapo, Javita, San Carlos, and Esmeralda, appear (from their situation at the mouth of the Guaviare, the portage between Tuamini and the Rio Negro, the confluence of the Cassiquiare, and the point of bifurcation of the Upper Oroonoko) to promise a considerable increase of population and prosperity. The same circumstances will take place in the fertile but uncultivated countries, through which flow the Guallaga, the Amazon, and the Oroonoko; as well as at the isthmus of Panama, the lake of Nicaragua, and the Rio Huasacualco, which furnish a communication between the two seas. The imperfection of political institutions may for ages have converted places, where the commerce of the world should be found concentred, into deserts; but the time approaches, when these obstacles will exist no longer. A vicious administration cannot always.

struggle against the united interests of men; and civilization will be carried insensibly into those countries, the great destinies of which nature itself proclaims, by the physical configuration of the soil, the immense windings of the rivers, and the proximity of two seas, that bathe the coasts of Europe and of India.

Esmeralda is the most celebrated spot on the Oroonoko for the fabrication of that active poison *, which is employed in war, in the chace, and, what is singular enough, as a remedy for gastric obstructions. The poison of the ticunas of the Amazon, the upas-tieute of Java, and the *curare* of Guyana, are the most deleterious substances that are known. Raleigh†, toward the end of the sixteenth century, had heard the name of *urari* pronounced as being a vegetable substance, with which arrows were envenomed; yet no fixed notions of this poison had reached Europe. The missionaries Gumilla and Gili had not been able to penetrate into the country, where the curare is manufactured. Gumilla asserts, that "this preparation was enveloped in great mystery; that it's principal ingredient was furnished by a subterraneous plant, by a tuberose-root, which never puts forth leaves, and which is called the root, by way of eminence,

* In Tamanac, *marana*, in Maypure, *macuri*.

† Cayley's Life of Raleigh, vol. ii, p. 13. Ap. p. 8.

raiz de si misma ; that the venomous exhalations, which arise from the pots, cause the old women (the most *useless*) to perish, who are chosen to watch over this operation; finally, that these vegetable juices never appear sufficiently concentrated, till a few drops produce *at a distance* a repulsive action on the blood. An Indian wounds himself slightly; and a dart, dipped in the liquid *curare*, is held near the wound. If it make the blood return to the vessels without having been brought into contact with them, the poison is judged to be sufficiently concentrated." I shall not stop to refute these popular tales collected by Father Gumilla. Why indeed should this missionary have hesitated to admit the action of the *curare at a distance*, when he had no doubt of the properties of a plant, which caused vomiting or purging, according as the leaves had been torn upward or downward from their stem* ?

When we arrived at Esmeralda, the greater part of the Indians were returning from an ex-

* " Llamo la atencion de los Fisicos sobre el fraylecillo ò la tuatua (æn euphorbiacea). Quantas ojas comiere, tantas evacuaciones ha de expeler. Si arranca las ojas tirano acia abaxo, cada oja causa una evacuacion; si las arranca hacia arriba, causan vomitos; y si arrancan unas para arriba y otras acia abaxo, concurre uno y otro efecto." *Gumilla*, vol. ii, p. 298, *Caulin*, p. 29.

cursion, which they had made to the east beyond the Rio Padamo, to gather *juvias*, or the fruit of the bertholletia, and the liana which yields the curare. Their return was celebrated by a festival, which is called in the mission *la fiesta de las juvias*, and which resembles our harvest homes and vintage feasts. The women had prepared a quantity of fermented liquor, and during two days the Indians were in a state of intoxication. Among nations that attach great importance to the fruits of the palm-trees, and of some others useful for the nourishment of man, the period when these fruits are gathered is marked by public rejoicings, and time is divided according to these festivals, which succeed one another in a course invariably the same. We were fortunate enough to find an old Indian less drunk than the rest, who was employed in preparing the *curare* poison from freshly-gathered plants. He was the chemist of the place. We found at his dwelling large earthen pots for boiling the vegetable juice, shallower vessels to favour the evaporation by a larger surface, and leaves of the plaintain tree rolled up in the shape of our filters, and used to filtrate the liquids, more or less loaded with fibrous matter. The greatest order and neatness prevailed in this hut, which was transformed into a chemical laboratory. The Indian, who was to instruct us, is known throughout the mission by the name of the *master*

of poison (amo del curare); he had that self-sufficient air and tone of pedantry, of which the pharmacopolists of Europe were formerly accused. "I know," said he, "that the whites have the secret of fabricating soap, and that black powder, which has the defect of making a noise, and killing animals, when they are wanted. The *curare*, which we prepare from father to son, is superior to any thing you can make *down yonder* (beyond sea). It is the juice of an herb, which *kills silently* (without any one knowing whence the stroke comes)."

This chemical operation, to which the *master of the curare* attached so much importance, appeared to us extremely simple. The liana *(bejuco)*, which is used at Esmeralda for the preparation of the poison, bears the same name as in the forests of Javita. It is the *bejuco de mavacure*, which is gathered in abundance east of the mission, on the left bank of the Oroonoko, beyond the Rio Amaguaca, in the mountainous and granitic lands of Guanaya and Yumariquin. Although the bundles of *bejuco*, which we found in the hut of the Indian, were entirely destitute of leaves, we had no doubt of their being produced by the same plant of the strychnos family (nearly allied to the rouhamon of Aublet), which we had examined in the forest of Pimichin*.

* *See* above p. 280. I shall here insert the description of

The mavacure is employed fresh or dried indif-

the curare, or bejuco de Mavacure, taken from a manuscript, yet unpublished of my learned fellow labourer Mr. Kunth, corresponding member of the Institute. "Ramuli lignosi, oppositi, ramulo altero abortivo, teretiusculi, fuscescenti-tomentosi, inter petiolos lineola pilosa notati, gemmula aut processu filiformi (pedunculo?) terminati. FOLIA opposita, breviter petiolata, ovato-oblonga, acuminata, integerrima, reticulato-triplinervia, nervo medio subtus prominente, membranacea, ciliata, utrinque glabra, nervo medio fuscescenti-tomentoso, lacte viridia, subtus pallidiora, 1½-2½ pollices longa, 8-9 lineas lata. PETIOLI lineam longi, tomentosi, inarticulati." Mr. Kunth adds, The *curare* cannot be a species of the genus phyllantus, because the leaves of the latter are alternate, and provided with two stipulæ, while in the *curare* the leaves are opposite, and without any trace of stipulæ. The idea of Mr. Willdenow, that the *curare* belongs to the genus coriaria, of which the berries only are poisonous, is altogether as little admissible. The leaves of the coriaria are somewhat fleshy, and sometimes alternate; in the *curare* they are membranous, and constantly opposite to each other. The petiolæ, in the coriaria, are perceptibly articulated to the branches, and fall off easily in the dried specimens; the *curare*, on the contrary, shows no articulation. The small gemmulæ, which de Jussieu mentions in describing the coriaria in his *Families of Plants*, are not found in the *curare*. Finally, the young branches are angular in the coriaria, and cylindrical in the *curare*. They have in the latter, a tendency to stretch out spirally as in the rouhamon of Aublet (lasiostoma, Willd.). It is to this last genus I would assimilate the *curare*; for the real strychneæ appear to belong exclusively to the East Indies. We find in the *curare* a row of small hairs between each pair of petiolæ; and this character, long since observed in the strychneæ, which are known for their deleterious properties, is of great weight in the comparison, which we think ourselves justified in making between such venomous plants."

ferently during several weeks. The juice of the liana, when it has been recently gathered, is not regarded as poisonous; perhaps it acts in a sensible manner only when it is strongly concentrated. It is the bark and a part of the alburnum, which contain this terrible poison. Branches of the *mavacure* 4 or 5 lines in diameter are scraped with a knife; and the bark that comes off is bruised, and reduced into very thin filaments, on the stone employed for grinding cassava. The venomous juice being yellow, the whole fibrous mass takes this colour. It is thrown into a funnel nine inches high, with an opening 4 inches wide. This funnel was of all the instruments of the Indian laboratory that of which the *master of poison* seemed to be most proud. He asked us repeatedly, if *por allà* (*down yonder*, that is in Europe) we had ever seen any thing to be compared to his *embudo*. It was a leaf of the plantain-tree rolled up in the form of a cone, and placed in another stronger cone made of the leaves of the palm-tree. The whole of this apparatus was supported by slight frame work made of the petioli and ribs of palm-leaves. A cold infusion is first prepared by pouring water on the fibrous matter, which is the ground bark of the *mavacure*. A yellowish water filters during several hours, drop by drop, through the leafy funnel. This filtered water is the venomous liquor, but it acquires strength only when it

is concentrated by evaporation, like melasses, in a large earthen pot. The Indian from time to time invited us to taste the liquid; it's taste, more or less bitter, decides when the concentration by fire has been carried sufficiently far. There is no danger in this operation, the *curare* being deleterious only when it comes into immediate contact with the blood. The vapors therefore, that are disengaged from the pans, are not hurtful, notwithstanding what has been asserted on this point by the missionaries of the Oroonoko. Fontana, in his fine experiments on the poison of the *ticunas* of the river of Amazons, long ago proved, that the vapours rising from this poison, when thrown on burning charcoal, may be inhaled without apprehension; and that it is false as M. de La Condamine has announced, that Indian women, when condemned to death, have been killed by the vapours of the poison of the *ticunas*.

The most concentrated juice of the *mavacure* is not thick enough to stick to the darts. It is therefore only to *give a body* to the poison, that another vegetable juice, extremely glutinous, drawn from a tree with large leaves, called *kiracaguero*, is poured into the concentrated infusion. As this tree grows at a great distance from Esmeralda, and was at that period as destitute of flowers and fruits as the *bejuco de mavacure*, we could not determine it botani-

cally. I have several times mentioned that kind of fatality, which withholds the most interesting plants from the examination of travellers, while thousands of others, of the chemical properties of which we are ignorant, are found loaded with flowers and fruits. In travelling rapidly, even within the tropics, where the flowering of the ligneous plants is of such long duration, scarcely an eighth of the trees can be seen furnishing the essential parts of fructification. The chances of being able to determine, I do not say the family, but the genus and species, is consequently as 1 to 8; and it may be conceived, that this unfavourable chance is felt most powerfully, when it deprives us of the intimate knowledge of objects, which afford a higher interest than that of descriptive botany.

At the instant when the glutinous juice of the kiracaguero tree is poured into the venomous liquor well concentrated, and kept in a state of ebullition, it blackens, and coagulates into a mass of the consistence of tar, or of a thick sirup. This mass is the *curare* of commerce. When we hear the Indians say, that the *kiracaguero* is as necessary as the *bejuco de mavacure* to the fabrication of the poison, we may be led into error, supposing, that the former also contains some deleterious principle, while it only serves (as the *algarobbo*, or any other gummy substance would do), to give more body

the concentrated juice of the *curare*. The change of colour, which the mixture undergoes, is owing to the decomposition of a hydruret of carbon; the hydrogen is burned, and the carbon is set free. The *curare* is sold in little calebashes; but it's preparation being in the hands of a few families, and the quantity of poison attached to each dart being extremely small, the *curare* of the first quality, that of Esmeralda and Mandavaca, is sold at a very high price. I have seen 5 or 6 franks paid for two ounces. This substance, when dried, resembles opium; but it attracts humidity powerfully, when it is exposed to the air. It's taste is of an agreeable bitter, and M. Bonpland and myself have often swallowed small portions of it. There is no danger in so doing, if it be certain, that neither lips nor gums bleed. In the recent experiments made by Mr. Mangili on the venom of the viper, one of his assistants swallowed all the venom that could be extracted from four large vipers of Italy, without being affected by it *. The Indians consider the curare, taken internally, as an excellent stomachic. The same poison prepared by the Piraoas and Salivas †, though it has some celebrity, is not

* Giornale di Fisica e di Chimica, vol. ix, p. 458.

† The Cabres, or Caveres, before their almost total destruction, were also much addicted to the fabrication of the *curare*.

so much esteemed as that of Esmeralda. The process of this preparation appears to be every where nearly the same; but there is no proof, that the different poisons sold by the same name at the Oroonoko and the Amazon are identical, and drawn from the same plants. Mr. Orfila therefore, in his excellent work on *general Toxicology*, has very judiciously separated the woorara of Dutch Guyana, the curare of the Oroonoko, the ticuna of the Amazon, and all those substances, which have been too vaguely united under the name of *American poisons**. Perhaps some future day one and the same alkaline principle, similar to the morphin of opium, and the vauquelin of the strychnos, will be found in venomous plants, which belong to different genera.

At the Oroonoko, the curare *de raix* (of the root) is distinguished from the curare *de bejuco* (of lianas, or of the bark of branches). We saw only the latter prepared; the former is weaker, and much less esteemed. At the river of the Amazons we learned to distinguish the poisons of the Ticuna, Yagua, Peva, and Xibaro Indians, which, proceeding from the same plant, perhaps differ only by a more or less careful preparation. The *toxique des Ticunas*, to which M.

* *Emmer, de Effectu Venenorum veget. American., Tub.* 1817.

de la Condamine has given so much celebrity in Europe, and which begins to bear the name of ticuna, somewhat improperly, is extracted from a liana, that grows in the island of Mormorote, in the Upper Maragnon. This *toxique* belongs partly to the Ticunas, who remain independant on the Spanish territory near the sources of the Yácarique ; and partly to Indians of the same tribe, inhabiting the Portugueze mission of Loreto. Poisons being indispensable in those climates to the existence of hunting nations, the missionaries of the Oroonoko and the Amazon seldom oppose this kind of manufacture. The poisons we have just named differ totally from that of La Peca*, and from the poison of Lamas and of Moyobamba. I enter into these details, because the vestiges of plants, which we were able to examine, proved to us (contrary to the common opinion), that the three *toxiques* of the Ticunas, of La Peca, and of Moyobamba, are not taken from the same species, probably not even from congeneric plants. In proportion as the preparation of the *curare* is simple, that of the poison of Moyobamba is long and complicated. With the juice of the *bejuco de ambihuasca*, which is the principal ingredient, are mixed pimento (capsicum), tobacco, barbasco (jacquinia armillaris), sanango (tabernæmon-

* A village of the province of Jaen de Bracamoros.

tana), and the milk of some other apocyneæ. The fresh juice of the *ambihuasca* exerts a deleterious action, if it touch the blood*; the juice of the *mavacure* is a mortal poison only when it is concentrated by fire; and ebullition deprives the juice of the root of jatropha manihot *(yucca amarga)* of all it's baneful qualities. In rubbing a long time between my fingers the liana which yields the cruel poison of La Peca, when the weather was excessively hot, my hands were benumbed; and a person who was employed with me felt the same effects from this rapid absorption by the uninjured integuments.

I shall not here enter into any detail on the physiological properties of those poisons of the New World, which kill with the same promptitude as the strychneæ of Asia (the vomit nut, the upas tieutæ, and the bean of Saint Ignatius), but without producing vomiting when they are received into the stomach, and without announcing the approach of death by the violent excitement of the spinal marrow. During our abode in America, we sent some *curare* of the Oroonoko, and joints of bamboo filled with the poison of the Ticunas and of Moyobamba, to Mr. Fourcroy and Mr. Vauquelin; and, after our return, we also furnished Mr. Magendie and

* Manuscript notes of Mr. Andivieles, an inhabitant of Lamas.

Mr. Delille, who have employed themselves so usefully on the *toxiques* of the torrid zone, with curare enfeebled by being transported through damp countries. Scarcely a fowl is eaten on the banks of the Oroonoko, which has not been killed with a poisoned arrow. The missionaries pretend, that the flesh of animals is never so good, as when these means are employed. Father Zea, who accompanied us, though ill of a tertian fever, caused every morning the live fowl allotted for our repast, to be brought to his hammock together with an arrow. Notwithstanding his habitual state of weakness, he would not confide this operation, to which he attached great importance, to any other person. Large birds, a guan *(pava de monte)* for instance, or a curassoa *(alector)*, when wounded in the thigh, perish in two or three minutes; but it is often ten or twelve before a pig or a pecari expires. M. Bonpland found, that the same poison, bought in different villages, varied much. We had procured at the river of Amazons some real *toxique* of the Ticuna Indians, which was weaker than all the varieties of the *curare* of the Oroonoko. It would be useless to tranquillize travellers respecting the apprehensions, which they often testify at their arrival in the missions, on learning that the fowls, monkeys, guanas, and even the fish which they eat, have been killed with poisoned arrows.

These fears vanish by habit and reasoning. Mr. Magendie has even proved by ingenious experiments on transfusion, that the blood of animals, in which the bitter strychnoses of India have produced a deleterious effect, has no fatal action on other animals. A dog received a considerable quantity of poisoned blood into his veins without any trace of irritation being perceived in the spinal marrow*.

I placed the most active *curare* in contact with the crural nerves of a frog, without perceiving any sensible change in measuring the degree of irritability of the organs, by means of an arc formed of heterogeneous metals. Galvanic experiments succeeded upon birds, some minutes after I had killed them with a poisoned arrow. These observations are not uninteresting, when we recollect, that a solution of the *upas tieute* poured upon the sciatic nerve, or insinuated into the texture of the nerve, produces also a sensible effect on the irritability of the organs by immediate contact with the medullary substance†. The danger of the *curare*, as of most of the other strychneæ, (for we continue to believe, that the *mavacure* belongs to a neighbouring family,) results only from the action of the poison on the vascular system. At May-

* *Magendie, sur les Organes de l'Absorption*, 1809, p. 13.

† *Raffineau-Delille, sur le Poison de Java*, 1809. p. 15.

pures, a *Zambo*, descended from an Indian and a Negro, prepared for Mr. Bonpland some of those poisoned arrows, that are placed in sarbacans to kill small monkeys or birds. He was a carpenter of remarkable muscular strength. Having had the imprudence to rub the *curare* between his fingers after being slightly wounded, he fell on the ground seized with a vertigo, that lasted nearly half an hour. Happily it was only weakened *curare* (*destemplado*), which is used for very small animals, that is, for those which it is pretended can be recalled to life by putting muriat of soda into the wound. During our voyage in returning from Esmeralda to Atures, I escaped myself an imminent danger. The *curare*, having imbibed the humidity of the air, had become fluid, and was spilt from an ill-closed vessel upon our linen. They who washed the linen had neglected to examine the inside of a stocking, which was filled with *curare*; and it was only on touching this glutinous matter with my hand, that I was warned not to draw on the poisoned stocking. The danger was so much the greater, as my feet at that time bled from the wounds made by chegoes (pulex penetrans), which had been ill extirpated. This incident may remind travellers of the prudence requisite in the conveyance of poisons.

A fine chemical and physiological investigation remains to be accomplished in Europe on

the *toxiques* of the New World, when, by more frequent communications, the *curare de bejuco*, the *curare de raiz*, and the various poisons of the Amazon, Guallaga, and Brazil, can be procured, without being confounded together, from the places where they are prepared. Chemists having discovered the pure hydrocyanic acid*, and so many new substances eminently deleterious, the introduction of poisons prepared by savage nations will be less feared in Europe; we cannot however appeal too strongly to the vigilance of those, who in the midst of very populous cities (the centres of civilization, misery, and depravity) preserve such noxious substances. Our botanical knowledge of the plants employed in making poison can be but very slowly acquired. Most of the Indians, who addict themselves to the fabrication of poisoned arrows, are totally ignorant of the nature of the venomous substances, which they receive from other people. A mysterious veil every where covers the history of *toxiques* and of antidotes. Their preparation among the sa-

* M. Gay-Lussac observes, that this acid, for the fine discovery of which we are indebted to him, cannot become very dangerous to society, because it's smell betrays it's presence, and because the facility with which it is decomposed makes it difficult to preserve.

vages is the monopoly of the *piaches*, who are at once priests, jugglers, and physicians; it is only from the natives transplanted to the missions, that any certain notions can be acquired on matters so problematical. Ages had elapsed before the Europeans were taught to know, from the investigations of Mr. Mutis, the *bejuco del guaco* (mikania guaco*), which is the most powerful of all antidotes against the bite of serpents, and of which we were fortunate enough to give the first botanical description.

The opinion is very general in the missions, that no cure is possible, if the *curare* be fresh, well concentrated, and have staid long in the wound, so as to have entered abundantly into the circulation. Among the specifics employed on the banks of the Oroonoko, and, according to Mr. Leschenault, in the Indian Archipelago, the most celebrated is muriat of soda†. The

* See pl. 105 of the *Plantes Equinoxiales*, which I published conjointly with Mr. Bonpland, vol. ii, p. 84.

† Oviedo (*Sommario delle Indie Orientali*) boasts of sea water as an antidote against vegetable poisons. The people in the missions never fail to relate to European travellers, that they have no more to fear from arrows dipped in *curare*, if they have a little salt in their mouth, than from the electric shocks of the gymnoti, when chewing tobacco. (See chap. 17, vol. iv, p. 347.) Raleigh recommends as an antidote to the *ourari* (*curare*) the juice of garlick. (*Cayley*, vol. i, p. 196.)

wound is rubbed with this salt, which is also taken internally. I had myself no direct and sufficiently convincing proof of the action of this specific. The experiments of Messrs. Delille and Magendie rather make against it's utility. On the banks of the Amazon, the preference among the antidotes is given to sugar; and the muriat of soda being a substance almost unknown to the Indians of the forests, it is probable, that the honey of bees, and that farinaceous sugar, which oozes from plantains dried in the sun, were anciently employed throughout Guyana. In vain have ammonia and eau de luce been tried against the *curare*; it is now known how uncertain these pretended specifics are, even when applied to wounds caused by the bite of serpents. Sir Everard Home* has shewn, that a cure is often attributed to a remedy, when it is owing only to the slightness of the wound, and to a very circumscribed action of the *toxique*. Animals may with impunity be wounded with poisoned arrows, if the wound be well laid open, and the point imbued with poison be withdrawn immediately after the wound is made. If salt or sugar be employed in these cases, people are tempted to take it for an excellent specific. Indians, who had been wounded in battle by

* Philos. Trans., 1810, Part I, p. 75.

weapons dipped in the *curare*, described to us the symptoms of being poisoned as entirely similar to those observed in the bite of serpents. The wounded person feels congestions in the head; and vertigoes that compel him to seat himself on the ground. He feels nausea, vomits repeatedly; and, while he is tormented by a raging thirst, numbness seizes all the parts that are near the wound.

The old Indian, who was called the *master of poison*, seemed flattered by the interest we had taken in his chemical processes. He found us sufficiently intelligent to have no doubt, that we knew how to make soap, and, next to the fabrication of *curare*, this art appeared to him one of the finest inventions of the human mind. When the liquid poison was poured into the vessels prepared for this purpose, we accompanied the Indian to the *festival of the juvias*. The harvest of *juvias*, or fruits of the *bertholletia excelsa*, was celebrated by dancing, and the excesses of the most savage intoxication. The hut, where the natives were assembled, displayed during several days a very singular aspect. There was neither table nor bench, but large roasted monkeys, blackened by smoke, were ranged in order resting against the wall. These were the *marimondes* (ateles belzebuth), and those bearded monkeys called *capuchins*, which must not be confounded with the weeper, or sai

(simia capucina of Buffon). The manner of roasting these anthropomorphous animals contributes singularly to render their appearance disagreeable in the eyes of civilized man. A little grating or lattice of very hard wood is formed, and raised one foot from the ground. The monkey is skinned, and bent into a sitting posture; the head generally resting on the arms, which are meagre and long; but sometimes these are crossed behind the back. When it is tied on the grating, a very clear fire is kindled below. The monkey, enveloped in smoke and flame, is broiled and blackened at the same time*. On seeing the natives devour the arm or leg of a roasted monkey, it is difficult not to believe, that this habit of eating animals, that so much resemble man in their physical organization, has, in a certain degree, contributed to diminish the horror of anthropophagy among savages. Roasted monkeys, particularly those that have a very round head, display a hideous resemblance to a child; the Europeans therefore, who are obliged to feed on quadrumanes, prefer separating the head and the hands, and serve up only the rest of

* Soon after my return to Europe, an engraving was published at Weimar from a drawing composed with great spirii by Mr. Schick at Rome, representing one of our resting places on the banks of the Oroonoko. In the foreground some Indians are occupied in roasting a monkey.

the animal at their tables. The flesh of monkeys is so lean and dry, that Mr. Bonpland has preserved in his collections at Paris an arm and hand, which had been broiled over the fire at Esmeralda; and no smell arises from them after a great number of years.

We saw the Indians dance. The monotony of this dance is increased by the women not daring to take a part in it. The men, young and old, form a circle, holding each other's hands; and turn sometimes to the right, sometimes to the left, for whole hours, with silent gravity. Most frequently the dancers themselves are the musicians. Feeble sounds, drawn from a series of reeds of different lengths, form a slow and plaintive accompaniment. The first dancer, to mark the time, bends both knees in a kind of cadence. Sometimes they all make a pause in their places, and execute little oscillatory movements, bending the body from one side to the other. These reeds ranged in a line, and fastened together, resemble the pipe of Pan, as we find it represented in the bacchanalian processions on Grecian vases. To unite reeds of different lengths, and make them sound in succession by passing them before the lips, is a simple idea, and naturally presented itself to every nation. We were surprised to see with what promptitude the young Indians constructed and tuned these pipes, when they found

reeds (*carices*) on the bank of the river. Men in a state of nature, in every zone, make great use of these gramina with high stalks. The Greeks said with truth, that reeds had contributed to subjugate nations by furnishing arrows, to soften men's manners by the charm of music, and to unfold their understanding by affording the first instruments for tracing letters. These different uses of reeds mark in some sort three different periods in the life of nations. We must admit, that the tribes of the Oroonoko are found at the first step of dawning civilization. The reed serves them only as an instrument of war and of hunting; and the Pan's pipes, of which we have spoken, have not yet, on those distant shores, yielded sounds capable of awakening mild and humane feelings.

We found in the hut allotted for the festival several vegetable productions, which the Indians had brought from the mountains of Guanaya, and which fixed all our attention. I shall only stop here to mention the fruit of the juvia, reeds of a prodigious length, and shirts made of the bark of marima. The *almendron*, or *juvia*, one of the most majestic trees of the forests of the New World, was almost unknown before our voyage to the Rio Negro. It begins to be found four days distance east of Esmeralda, between the Padamo and Ocamo, at the foot of the Cerro Mapaya, on the right bank of the Oroonoko.

It is still more abundant on the left bank, at the Cerro Guanaja, between the Rio Amaguaca and the Gehette. The inhabitants of Esmeralda assured us, that in advancing above the Gehette and the Chiguire, the *juvia* and cacao-trees become so common, that the wild Indians (the Guaicas and Guahariboes *blancos*) do not disturb the Indians of the missions, when gathering in their harvests. They do not envy them the productions, with which nature has enriched their own soil. Scarcely any attempt has been made to propagate the *almendrones* in the settlements of the Upper Oroonoko. The indolence of the inhabitants is a greater obstacle than the rapidity, with which the oil becomes rancid in the amygdaliform seeds. We found only three trees at the mission of San Carlos, and two at Esmeralda. These majestic trees, eight or ten years old, had not yet borne flowers. I mentioned above, that Mr. Bonpland had made known the *almendrones* to the Indians, among the trees that cover the banks of the Cassiquiare, near the rapids of Cananivacari*.

Ever since the sixteenth century the seeds with ligneous and triangular teguments, but not the great *drupe* like a cocoa-nut, which contains the almonds, had been known in Europe.

* See above, p. 409.

I recognise this in an imperfect engraving of Clusius*. This botanist designates them under the name of *almendras del Peru.* They had no doubt been carried, as a very rare fruit, to the Upper Maragnon, and thence, by the Cordilleras, to Quito and Peru. The *Novus Orbis* of Jean de Laet, in which I found the first account of the cow-tree, furnishes also a description and a figure singularly exact of the fruit of the bertholletia. Laet calls the tree totocke, and mentions the *drupe*† of the size of the

* *Exoticor.*, lib. 2, cap. 18, p. 44. Clusius distinguishes very properly the *almendras del Peru,* our bertholletia excelsa, or *juvia,* (fructus amygdalæ-nucleo, triungularis, dorso lato, in bina latera angulosa desinente, rugosus, paululum cuneiformis) from the pekea, or amygdala guayauica (*Exot.*, lib. ii, cap. 6, p. 27). Raleigh, who knew none of the productions of the Upper Oroonoko, does not speak of the *juvia;* but it appears, that he first brought to Europe the fruit of the mauritia palm, of which we have so often spoken. (See *Clus, Exot.*, lib. xvi, cap. 4, p. 25. Fructus elegantissimus, squamosus, similis palmæ-pini.)

† The following is the remarkable description, for which botanists have scarcely looked in a work merely geographical, published in 1640. " Arbor (*ademonie*) *totocke* est valde procera et ramosa : foliis grandibus et quæ forma non multum abludunt ab ulmi frondibus, obscure viridentibus, nisi quod postica parte nonnihil videntur candicare. Nullos fert flores sed certas gemmas quæ colore nihil differunt a foliis, quæ sensim crassescunt et protrudunt fructum grandem et mole interdum capitis humani, pene rotundum antica parte nonnihil compressum, cortice ligneo, duro et admodum

human head, which contains the almonds. The weight of these fruits, he says, is so enormous, that the savages dare not enter the forests without covering their heads and shoulders with a buckler of very hard wood. These bucklers are unknown to the natives of Esmeralda, but they also told us of the dangers incurred when the fruit ripens, and falls from a height of fifty or sixty feet. The triangular seeds of the juvia are sold in Portugal and England under the vague name of chesnuts (*castanas*) or nuts of Brazil and the Amazon; and it was long believed, that, like the fruit of the pekea, they grew on separate stalks. They have furnished an article of a tolerably brisk trade for a cen-

crasso, exterius striato et tuberoso, coloris fusci et pene nigri. Dividitur interius certis septis in sex veluti regiones, in quarum singulis concluduntur octodecim et interdum duodecim nuces arcte inter se conjunctæ: quæ singulæ iterum ligneo et satis duro cortice tectæ sunt et variæ formæ pleræque tamen triangulares una parte convexiore, cum tribus veluti suturis, valde rugosæ et asperæ, minus tamen quam exterior cortex, tres uncias longæ et sesquiunciam latæ, coloris rossi, et interdum cinerei aut fusci: his continetur oblongus nucleus, totas implens instar amygdali, rubicunda membrana tectus, carne candidissima, solida et nonnihil oleosa; sapore magis videtur accedere ad avellanas quam amygdala, horum tamen usum in omnibus egregie potest suplere, etiam ad tragemata facienda, uti a nostris (Belgis) fuit observatum. Barbari dicunt, si Venerem ambis, comede *tofocke* fructum." (*Laet*, p. 632. Compare our *Plantes equinoxiales*, tom. i, p. 122, Pl. 36.)

tury past to the inhabitants of Grand Para, by whom they are sent either directly to Europe, or to Cayenne, where they are called *touka*. The celebrated botanist, Mr. Correa de Serra, told us, that this tree abounds in the forests in the neighbourhood of Macapa, at the mouth of the Amazon; that it there bears the name of *capucaya*; and that the inhabitants gather the almonds, like those of the lecythis, to express the oil. A cargo of almonds of the juvia, brought into Havre, captured by a privateer, in 1807, was employed for the same purpose.

The tree, that yields the *chesnuts of Brazil*, is generally not more than two or three feet in diameter, but attains one hundred or one hundred and twenty feet in height. It does not resemble the mammeæ, the star-apple, and several other trees of the tropics, the branches of which (as in the laurel-trees of the temperate zone) rise almost straight toward the sky. The branches of the bertholletia are open, very long, almost entirely bare toward the base, and loaded at their summits with tufts of very close foliage. This disposition of the semicoriaceous leaves, a little silvery beneath, and more than two feet long, makes the branches bend down toward the ground, like the fronds of the palm-trees. We did not see this majestic tree in blossom, it is not loaded with flowers* till it's fifteenth year,

* According to accounts somewhat vague, they are yel-

and they appear about the end of March and the beginning of April. The fruits ripen toward the end of May, and some trees retain them till the end of August. These fruits, which are as large as the head of a child, often twelve or thirteen inches in diameter, make an enormous noise in falling from the tops of the trees. I know nothing more fitted to seize the mind with admiration of the force of organic action in the equinoctial zone, than the aspect of these great ligneous pericarps, for instance, the cocoa-tree of the Maldives (lodoicea) among the monocotyledons, and the bertholletia and the lecythis among the dicotyledons. In our climates the cucurbitaceæ only produce in the space of a few months fruits of an extraordinary size; but these fruits are pulpy and succulent. Between the tropics, the bertholletia forms in less than fifty or sixty days a pericarp, the ligneous part of which is half an inch thick, and which it is difficult to saw with the sharpest instruments. A great naturalist* has already observed, that the *wood of fruits* attains in general

low, very large, and have some similitude to those of the bombax ceiba. Mr. Bonpland says however, in his botanical journal written on the banks of the Rio Negro, *flos violaceus*. It was thus the Indians of the river had described to him the colour of the corolla.

* Richard, *Analyses des Fruits*, p. 9.

a hardness, which is scarcely to be found in the wood of the trunks of trees. The pericarp of the bertholletia has traces of four cells, and I have sometimes found even five. The seeds have two very distinct coverings, and this circumstance renders the structure of the fruit more complicated than in the lecythis, the pekea or caryocar, and the saouvari. The first tegument is osseous, or ligneous, triangular, tuberculated on it's exterior surface, and of the colour of cinnamon. Four or five, and sometimes eight of these triangular nuts, are attached to a central partition. As they are loosened in time, they move freely in the large spherical pericarp. The capuchin monkeys (simia chiropotes) are singularly fond of the *chesnuts of Brazil;* and the noise made by the seeds, when the fruit is shaken as it fell from the tree, excites the appetency of these animals in the highest degree. I have most frequently found only from fifteen to twenty-two nuts in each fruit. The second tegument of the almonds is membranaceous, and of a brown yellow. Their taste is extremely agreeable when they are fresh; but the oil, with which they abound, and which is so useful in the arts, becomes easily rancid. Although at the Upper Oroonoko we often ate considerable quantities of these almonds for want of other food, we never felt any bad effects from so doing. The spherical pericarp of the

bertholletia, perforated at the summit, is not dehiscent; the upper and swelled part of the columella forms (according to Mr. Kunth) a sort of inner cover, as in the fruit of the lecythis, but it seldom opens of itself. Many seeds, from the decomposition of the oil contained in the cotyledons, lose the faculty of germination, before the rainy season, in which the ligneous integument of the pericarp opens by the effect of putrefaction. A tale is very current on the banks of the Lower Oroonoko, that the capuchin and cacajao monkeys (simia chiropotes, and simia melanocephala) place themselves in a circle, and, by striking the shell with a stone, succeed in opening it, to take out the triangular nuts. This operation must be impossible, on account of the extreme hardness and thickness of the pericarp. Monkeys may have been seen busied in rolling along the fruit of the bertholletia, but though this fruit has a small hole closed by the upper extremity of the columella, nature has not furnished monkeys with the means of opening the ligneous pericarp, as it has of opening the covercle of the lecythis, called in the missions *the covercle of the cocoa of the monkeys**. According to the report of several Indians of great veracity, the little glires only,

* *La tapa* (the covercle) *del coco de Monos.*

particularly the cavies (the *acuri* and the *lapa*†), by the structure of their teeth, and the inconceivable perseverance with which they pursue their destructive operations, succeed in perforating the fruit of the *juvia*. As soon as the triangular nuts are spread on the ground, all the animals of the forest, the monkeys, the manaviris, the squirrels, the cavies, the parrots, and the macaws, hasten thither, to dispute the prey. They have all strength enough to break the ligneous tegument of the seed; they get out the kernel, and carry it to the tops of the trees. "It is their festival also," said the Indians who had returned from the harvest; and on hearing their complaints of the animals you perceive, that they think themselves alone the legitimate masters of the forest.

The frequency of the juvia to the east of Esmeralda seems to indicate, that the Flora of the Amazon begins at that part of the Upper Oroonoko, which extends south of the mountains. This is in some sort a new proof of the union of two basins of rivers. M. Bonpland has very clearly shown the means, which should be employed to multiply the bertholletia excelsa on the banks of the Oroonoko, the Apure, the Meta, and throughout the province of Venezuela. In those places where this tree grows

† Cavia agati, c. paca.

naturally, thousands of seeds, the germination of which has just commenced, should be gathered, and placed as in a nursery in boxes filled with the mould, in which they have begun to vegetate. The young plants, sheltered from the rays of the sun by the leaves of musaceæ or of palm-trees, might be transported in canoes or on rafts. It is well known how difficult it is, notwithstanding the use of chlorine, which I have indicated elsewhere, to make seeds with a horny perisperm germinate in Europe; such as the palm-trees, the coffeaceæ, the quinquinas, and the large ligneous nuts, the kernel of which contains an oil that becomes rancid. All these difficulties would be vanquished, if only such seeds were transported, as had germinated under the tree itself. In this manner we succeeded in carrying a great number of very rare plants, for instance, the coumarouna odora, or the *Tonga bean*, from the Cataracts of the Oroonoko to Angostura, and spreading them in the surrounding plantations.

One of the four canoes, which had taken the Indians to the gathering of the *juvias*, was filled in great part with that species of reeds (*carices*), of which the *sarbacans* are made. These reeds were from fifteen to seventeen feet long, yet no trace of a knot for the insertion of leaves and branches was perceived. They were quite straight, smooth without, and perfectly cylin-

drical. These *carices* come from the foot of the mountains of Yumariquin and Guanaja. They are much sought after, even beyond the Oroonoko, by the name of the *reeds of Esmeralda*. A hunter preserves the same *sarbacan* during his whole life, and boasts of the lightness and precision of his sarbacan, as we boast of the same qualities in our fire arms. What is the monocotyledonous plant*, that furnishes these admirable reeds? Did we see in fact the internodes (parts between the knots) of a gramen of the tribe of nastoides? or may this *carex* be perhaps a cyperaceous plant† destitute of knots? I cannot solve this question, or determine to what genus another plant belongs, which furnishes the shirts of *marima*. We saw on the slope of the Cerra Duida *shirt trees* fifty feet high‡. The Indians cut off cylindrical pieces two feet in diameter, from which they peel the red and fibrous bark, without making any longitudinal incision. This bark affords them a sort of garment, which resembles sacks of a very coarse

* The smooth surface of the sarbacans sufficiently proves, that they are not furnished by a plant of the family of umbelliferæ.

† The *caricillo del manati*, which grows abundantly on the banks of the Oroonoko, attains from eight to ten feet in height.

‡ Arbor ramosissima, foliis oblongis acutis, integerrimis, longe petiolatis, petiolis fuscis.

texture, and without a seam. The upper opening serves for the head; and two lateral holes are cut to admit the arms. The natives wear these shirts of marima in the rainy season: they have the form of the *ponchos* and *ruanas* of cotton, which are so common in New Grenada, at Quito, and in Peru. As in these climates the riches and beneficence of nature are regarded as the primary causes of the indolence of the inhabitants, the missionaries do not fail to say in showing the shirts of *marima*, "in the forests of the Oroonoko garments are found ready made on the trees." We may add to this tale of the shirts the pointed caps, which the spathes of certain palm-trees furnish, and which resemble coarse network*.

At the festival of which we were spectators, the women were excluded from the dance, and every sort of public rejoicing; they were daily occupied in serving the men with roasted monkey, fermented liquors, and the palm cabbage. I mention this last production, which has the taste of our cauliflowers, because in no other country had we seen specimens of such an immense size. The leaves that are not unfolded are confounded with the young stem, and we measured cylinders of six feet long and five inches in diameter. Another substance, which

* See chap. 16, vol. iv, p. 226.

is much more nutritive, is obtained from the animal kingdom: this is *fish flour**. The Indians in all the Upper Oroonoko fry fish, dry them in the sun, and reduce them to powder without separating the bones. I have seen masses of fifty or sixty pounds of this flour, which resembles that of cassava. When it is wanted for eating, it is mixed with water, and reduced to a paste. In every climate the abundance of fish has led to the invention of the same means of preserving them. Pliny and Diodorus Siculus have described the *fish bread* of the ichthyophagous nations†, that dwelt on the Persian gulf, and the shores of the Red Sea.

At Esmeralda, as every where else throughout the missions, the Indians who will not be baptized, and who are merely aggregated in the community, live in a state of polygamy. The number of wives differs much in different tribes;

* *Manioc de pescado.*

† These nations, in a still ruder state than the natives of the Oroonoko, contented themselves with drying the raw fish in the sun. They made up the fish paste in the form of bricks, and sometimes mixed with it the aromatic seed of paliurus (rhamnus), as in Germany, and some other countries of the north, cummin and fennel seed are mixed with wheaten bread. *Pliny*, lib. 7, cap. 3 (vol. i, p. 374. ed. Par., 1723). *Diod. Sic.*, p. 154. *Arrian. Ind.*, p. 566.

it is most considerable among the Caribbees, and all the nations that have preserved the custom of carrying off young girls from the neighbouring tribes. How shall we speak of domestic happiness in so unequal an association? The women live in a sort of slavery, as they do in most nations in a state of barbarism. The husbands being in the full enjoyment of absolute power, no complaint is heard in their presence. An apparent tranquillity prevails in the house; the women are eager to anticipate the wishes of an imperious and sullen master; and they take care indistinctly of their own children and those of their rivals. The missionaries assert, what may easily be believed, that this domestic peace, the effect of common fear, is singularly disturbed when the husband is long absent. The wife who contracted the first ties then applies to the others the names of concubines and servants. The quarrels continue till the return of the master, who knows how to calm their passions by the sound of his voice, by a mere gesticulation, or, if he think it necessary, by means a little more violent. A certain inequality in the rights of the women is sanctioned by the language of the Tamanacs. The husband calls the second and third wife the *companions* of the first; and the first treats these *companions* as rivals and *enemies* (*ipucjatoje*), which

is less polite, but more true, and more expressive. The whole weight of labour being supported by these unhappy women, we must not be surprised, if in some nations their number is extremely small. Where this happens, a kind of polyandry is formed, which we find more fully displayed in Thibet, and on the lofty mountains at the extremity of the Indian peninsula. Among the Avanoes and the Maypures, brothers have often but one wife. When an Indian, who lives in polygamy, becomes a Christian, he is compelled by the missionaries, to choose among his wives her whom he prefers, and to reject the others. The moment of separation is the critical moment; the new convert finds the most valuable qualities in the wives he must abandon. One understands gardening perfectly; another knows how to prepare the *chiza*, an intoxicating beverage extracted from the root of cassava; all appear to him alike necessary. Sometimes the desire of preserving his wives overcomes in the Indian his inclination to Christianity; but most frequently the husband prefers submitting to the choice of the missionary, as to a blind fatality.

The Indians, who from the month of May to that of August take journeys to the east of Esmeralda, to gather the vegetable productions of the mountains of Yumariquin, gave us precise

notions of the course of the Oroonoko to the east of the mission. This part of my *itinerary map* differs entirely from those that preceded it. I shall begin the description of this country with the granitic group of Duida, at the foot of which we sojourned. This group is bounded on the west by the Rio Tamatama, and on the east by the Rio Guapo. Between these two tributary streams of the Oroonoko, amid the *Morichales*, or clumps of mauritia palm-trees, which surround Esmeralda, the Rio Sodomoni descends, celebrated for the excellence of the pine apples that grow upon it's banks. I measured on the 22d of May, in the savannah at the foot of Duida, a base of four hundred and seventy-five metres in length; the angle, under which the summit of the mountain appeared at the distance of thirteen thousand three hundred and twenty-seven metres, was still nine degrees. A trigonometric measurement made with care gave me for Duida (that is for the most elevated peak, which is south-west of the *Cerro* Maraguaca) two thousand one hundred and seventy-nine metres, or one thousand one hundred and eighteen toises, above the plain of Esmeralda*.

* Base directed toward the summit of Duida, four hundred and seventy-five metres. Double angles of altitude at the two extremities of the base 18° 0′ 10″, and 18° 38′ 0″. Height of Duida above the base 2179 metres = 1118 toises

It's height above the level of the ocean is therefore probably near thirteen hundred toises; I say probably, because I had the misfortune to break my barometer before I reached Esmeralda. The rains fell so violently in our resting places, that we could not preserve the instrument from the effects of humidity, and the tube was broken by the unequal dilatation of the wood. I regretted this accident the more, as never had a barometer resisted longer journeys. I had used it during three years in Europe, amid the mountains of Styria, France, and Spain, and in America on the way from Cumana to the Upper Oroonoko. The country between Javita, Vasiva, and Esmeralda, is a vast plain; and having opened the barometer in the former two of these places, I do not fear being mistaken in more than fifteen or twenty toises in the absolute height of the savannahs of Sodomoni. The *Cerro* Duida yields little in height (scarcely eighty or one hundred toises) to the summit* of St. Gothard, or the Silla of Caraccas on the shore of Venezuela. It is indeed considered as a colossal mountain in those countries; and this celebrity gives a precise

= 2605 varas, Cast. Height of Esmeralda above the level of the sea, probably 177 toises, See above, chap. 22, p. 251.

* Le Pettine.

idea of the mean height of Parima and of all the mountains of eastern America. To the east of the Sierra Nevada de Merida, as well as to the south east of the Paramo de las Rosas, none of the chains, that extend in the direction of the latitude, reach the height of the central ridge of the Pyrenees.

The granitic summit of Duida is so nearly perpendicular, that the Indians have vainly attempted the ascent. It is known, that mountains the least elevated are sometimes the most inaccessible. At the beginning and the end of the rainy season small flames, which seem to change their place, are seen on the top of Duida. This phenomenon, which it is difficult to doubt, on account of the agreement in the testimony concerning it, has given this mountain the improper name of a volcano. As it stands nearly alone, it might be supposed, that lightning from time to time sets fire to the brush-wood; but this supposition loses it's probability, when we reflect on the extreme difficulty, with which plants are set on fire in these damp climates. It must be observed also, that these little flames are said to appear often where the rock seems scarcely covered with turf, and that the same igneous phenomena are displayed on days entirely exempt from storms on the summit of Guaraco, or Murcielago, a hill opposite the mouth of the Rio Tamatama, on

the southern bank of the Oroonoko. This hill is scarcely elevated one hundred toises above the neighbouring plains. If the assertions of the natives be true, it is probable, that some subterraneous cause exists in Duida and Guaraco, that produces these flames; for they never appear in the lofty neighbouring mountains of Jao and Maraguaca, so often wrapped in electric storms. The granite of the Cerro Duida is full of veins, partly open, and partly filled with crystals of quartz and pyrites. Gaseous and inflammable emanations, either of hydrogen, or of naphtha, may pass through these veins. Of this the mountains of Caramania, of Hindoo-kho, and of Himalaya, furnish frequent examples. We saw the appearance of flames in many parts of eastern America subject to earthquakes, even from secondary rocks, as at Cuchivero near Cumanacoa*. The fire shows itself when the ground, strongly heated by the sun, receives the first rains; or when, after violent showers, the earth begins to dry. The first cause of these igneous phenomena is at immense depths below the secondary rocks, in the primitive formations: the rains, and the decomposition of atmospheric water, act only a secondary part. The hottest springs of the Globe issue immediately from granite†. Petroleum gushes

* See vol. iii. chap. 6, p. 82.

† See vol. iv, chap. 16, pp. 171 and 195.

from mica-schist; and frightful detonations are heard at Encaramada, between the rivers Arauca and Cuchivero, in the midst of the granitic soil ‡ of the Oroonoko and the Sierra Parima. Here, as every where else on the Globe, the focus of volcanoes is in the most ancient soils; and it appears, that an intimate connection exists between the great phenomena, that heave up and liquify the crust of our planet, and those igneous meteors, which are seen from time to time on it's surface, and which from their littleness we are tempted to attribute solely to the influence of the atmosphere.

Duida, though lower than the height assigned to it by popular belief, is however, the most prominent point of the whole group of mountains, that separate the basin of the Lower Oroonoko from that of the Amazon. These mountains lower still more rapidly on the north-east, toward the Purunama, than on the east, toward the Padamo and the Rio Ocamo. In the former direction, the most elevated summits after Duida, are *Cuneva*, at the sources of the Rio Paru (one of the tributary streams of the Ventuari), *Sipapo*, *Calitamini*, which forms one group with *Cunavami* and the peak of *Uniana**. East of Duida, on the right bank of

‡ Vol. ii, chap. 5, p. 291; vol. iv, chap. 14, p. 45.

* See vol. ii, chap. 17, p. 304; chap. 19, p. 469; vol. v, chap. 20, p. 43, 134; chap. 21, p. 167, 175; chap. 23, p

the Oroonoko, *Maravaca*, or Sierra Maraguaca, is distinguished by it's elevation, between the Rio Caurimoni and the Padamo; and on the left bank of the Oroonoko rise the mountains of Guanaja and Yumariquin, between the Rios Amaguaca and Gehette. It is almost superfluous to repeat, that the line which passes through these lofty summits (like those of the Pyrenees, the Carpathian mountains, and so many other chains of the ancient continent) is very distinct from the line, that marks the partition of the waters. This latter line, which separates the

375, 451. I never heard the Indians of the Upper Oroonoko name the three mountains, Jujamari, Javi, and Siamacu, which the missionary Gili (vol. i, p. 39, 133, 156; vol. ii, p. 28) indicates as being very lofty, giving at the same time the most confused notions of their geographical situation. Jujamari appears to be north-east of the Cerro de Sipapo, which I have described above; Javi and Siamacu (Chamacu, Samacu), of the existence of which Caulin also was ignorant, are (I believe) between the sources of the Ventuari and the Cuchivero. The natives described Siamacu to father Gili as a very cold place. Now, on a mountain eight hundred toises high, the centigrade thermometer, in that zone, may fall to ten degrees, which causes a feeling of cold very sensible to people habituated to a temperature of twenty-eight or thirty degrees. At Caraccas (height four hundred and fifty-four toises), I saw the thermometer at 12° 5′. The name of Siamacu is perhaps derived from the rounded form of the mountain. This name indicates in Tamanac a vase of hemispheric form, used to keep the *chiza* in.

tributary streams of the Lower and Upper Oroonoko, cuts the meridian of 64° in 4° of latitude. After having separated the sources of the Rio Branco and the Caroni, it runs to the northwest, sending off the waters of the Padamo, the Jao, and the Ventuari, toward the south, and the waters of the Arui, the Caura, and the Cuchivero, toward the north.

The Oroonoko may be ascended without danger from Esmeralda as far as the cataracts occupied by the Guaica Indians, who prevent all ulterior progress of the Spaniards. This is a voyage of six days and half*. In the first two you arrive at the mouth of the Rio Padamo, after having passed, on the north, the little rivers of Tamatama, Sodomoni, Guapo, Caurimoni, and Simirimoni; and on the south, the Cuca, situate between the rock of Guaraco, which is said to throw out flames, and the *Cerro* Canclilla. In this passage the Oroonoko continues to be three or four hundred toises broad. The tributary streams are most frequent on the right bank,

* From Esmeralda to the mouth of the Rio Padamo, two days; from Padamo to the confluence of the Mavaca, one day and a half; from the Mavaca to the Rio Manaviche, one day; from the Manaviche to the Rio Gehette, or the Raudal of the Guahariboes, one day; in all six days and a half. [The different portions of the voyage added together make but five days and a half, and with this the account in the text agrees. Ed.]

because on this side the river is bounded by the lofty mountains of Duida and Maraguaca, on which the clouds are piled together, while the left bank is low and contiguous to a plain, the general slope of which inclines to the south-west. The northern Cordilleras are covered with fine timber. The growth of plants is such in this ardent and constantly humid climate, that the trunks of the bombax ceiba* are sixteen feet in diameter. The Rio Padamo, or Patamo, by which the missionaries of the Upper Oroonoko communicated heretofore with those of the Rio Caura, has become a source of error to geographers. Father Caulin gives it the name of Macoma, and places another Rio Patamo between the point of bifurcation of the Oroonoko and a mountain called Ruida, which is no doubt identically the same with the *Cerro* Duida. Surville makes the Padamo communicate with the Rio Ocamo (Ucamu), which is entirely independant of it; finally, a small tributary stream of the Oroonoko, on the west of the bifurcation, is indicated in the great map of La Cruz as the Rio Padamo†, and the river that really bears this name is called Rio Maquiritari. From the

* The extraordinary dimensions attained by those species of bombax, which are of very light wood, was known to Cardinal Bembo. *Hist. Ven.*, 1551, fol. 83.

† The Patamo of La Cruz is changed, so as to make it almost *Greek*, into Potamo, in Arrowsmith's map.

mouth of this river, which is of considerable breadth, the Indians arrive, in a day and half, at the Rio Mavaca, which rises in the lofty mountains of Unturan *, which we have already mentioned. The portage between the sources of this tributary stream and those of the Idapa or Siapa, has given rise to the fable of the communication of the Idapa with the Upper Oroonoko. The Rio Mavaca communicates with a lake, to the banks of which the Portugueze † of the Rio Negro repair, without the knowledge of the Spaniards of Esmeralda, to gather the aromatic seeds of the laurus pucheri, known in trade by the names of the *pichurim bean*, and *toda specie*. Between the confluence of the Padamo and that of the Mavaca, the Oroonoko receives on the north the Ocamo, into which the

* See above, chap. 23, p. 376, and 419.

† They enter the Spanish territory by the communication between the Cababury, and the Pacimoni. The pichurim bean is the *puchiri* of M. de la Condamine, which abounds at the Rio Xingu, a tributary stream of the Amazon, and on the banks of the Hyurubaxy, or Jurubesh of father Fritz, which runs into the Rio Negro. *Voyage à l'Amazone*, p. 146; and *Corog. Bras.*, vol. ii, p. 278, 322, 351. The puchery, or pichurim, which is grated like nutmeg, differs from another aromatic fruit (a laurel?) known in trade at Grand Para by the names of cucheri, cuchiri, or *cravo* (clavus) *do Maranhao*, and which, on account of it's smell, is compared with cloves.

Rio Matacona falls. At the sources of the latter live the Guainares, who are much less copper-coloured, or tawny, than the other inhabitants of those countries. This is one of the tribes called by the missionaries *fair Indians*, or *Indios blancos*, respecting whom I shall soon treat more at large. Near the mouth of the Ocamo, travellers are shown a rock, which is the wonder of the country. It is a granite passing into gneiss, and remarkable for the peculiar distribution of the black mica, which forms little ramified veins. The Spaniards call this rock *Piedra Mapaya* (the map-stone). The little fragment which I procured indicated a stratified rock, rich in white feldspar, and containing, beside spangles of mica, which are grouped in streaks, and variously twisted, some crystals of hornblende. It is not a syenite, but probably a granite of new formation, analagous to those, to which the stanniferous granites (hyalomictes), and the pegmatites, or graphic granites, belong.

Beyond the confluence of the Mavaca, the Oroonoko suddenly diminishes in breadth and depth, becoming extremely sinuous like an Alpine torrent. It's two banks are surrounded by mountains, and the number of it's tributary streams on the south augments considerably, yet the Cordillera on the north remains the most elevated. It requires two days to go from the mouth of the Mavaca to the Rio Gi-

hette, the navigation being very inconvenient, and the boats, on account of the want of water, being often dragged along the shore. The tributary streams in this distance are, on the south, the Daracapo and the Amaguaca; which skirt on the west and east the mountains of Guanaya and Yumariquin, where the bertholletias *(chesnuts of the Maragnon)* are gathered. The Rio Manaviche flows down from the mountains on the north, the elevation of which diminishes progressively from the Cerro Maraguaca. As you continue to go up the Oroonoko, the whirlpools and little rapids (*chorros y remolinos*) become more and more frequent; on the north lies the *Canno* Chiquire, inhabited by the Guaicas, another tribe of white Indians; and two leagues distant is the mouth of the Gehette, where there is a great cataract. A dyke of granitic rocks crosses the Oroonoko; these rocks are the columns of Hercules, beyond which no white man has been able to penetrate. It appears, that this point, known by the name of the great *Raudal de Guahariboś*, is three quarters of a degree west of Esmeralda, consequently in 67° 38′ of longitude. A military expedition, undertaken by the commander of the fort of San Carlos, Don Francisco Bovadilla, to discover the sources of the Oroonoko, led to the most minute information we had respecting the cataracts of the Guahariboes. This commander had heard,

that some fugitive Negroes from Dutch Guyana, proceeding toward the west (beyond the isthmus between the sources of the Rio Carony and the Rio Branco), had joined the independant Indians. He attempted an *entrada* (hostile incursion), without having obtained the permission of the governor; the desire of procuring African slaves, better fitted for labour than the copper-coloured race, was a far more powerful motive than that of zeal for the progress of geography. I had an opportunity at Esmeralda, and at the Rio Negro, of interrogating several intelligent military men, who had made a part of that expedition. Bovadilla arrived without difficulty as far as the little *Raudal* * opposite the Gehette; but having advanced to the foot of the rocky dike, that forms the great cataract, he was suddenly attacked, while he was breakfasting, by the Guahariboes and Guaycas, two warlike tribes, celebrated for the activity of the *curare*, with which their arrows are empoisoned. The Indians occupied the rocks, that rise in the middle of the river, and seeing the Spaniards without bows, and having no knowledge of fire-arms, they provoked the whites, whom they believed to be without defence. Several of the

* This cataract is called *Raudal de abaxo*, in opposition to the great *Raudal de Guaharibos*, which is situate higher up toward the east.

latter were dangerously wounded, and Bovadilla found himself forced to give the signal of battle. A horrible carnage ensued among the natives, but none of the Dutch Negroes, who it was believed had taken refuge in those parts, were found. Notwithstanding a victory so easily won, the Spaniards did not dare to advance toward the east in a mountainous country, and along a river inclosed by very high banks.

The *Guahariboes blancos* have constructed a bridge of lianas above the cataracts, supported on rocks that rise, as it generally happens in the *Pongos* of the Upper Maragnon, in the middle of the river. The existence of this bridge *, which is known to all the inhabitants of Esmeralda, seems to indicate, that the Oroonoko is already very narrow at this point. It is generally estimated by the Indians to be only two or three hundred feet broad. They say, that the Oroonoko above the Raudal of the Guahariboes is no longer a river, but a brook (*riachuelo*); while a well-informed ecclesiastic, Fray Juan Gonzales, who had visited those countries, assured me, that the Oroonoko, where it's ulte-

* The Amazon also is passed twice on bridges of wood near it's origin in the lake Lauricocha; first north of Chavin, and then below the confluence of the Rio Aguamiras. These, the only two bridges that have been thrown over the largest river we yet know, are called *Puente de Quivilla*, and *Puente de Guancaybamba*.

terior course is no longer known, continues to be two thirds of the breadth of the Rio Negro near San Carlos. This opinion appears to me less probable; but I relate what I have collected, and affirm nothing positively. I know by the numerous measurements which I have taken, how easily we may be deceived in the dimensions of the beds of rivers. In fact, rivers appear more or less broad according as they are surrounded by mountains or plains, free from islets, or full of shoals, swelled by violent rains, or bereft of their waters by long drought. We may recollect also, that the course of the Ganges is unknown to the north of Gangootra; and that, on account of it's little breadth, this point is believed to be very near it's source.

In the rocky dike that crosses the Oroonoko, forming the Raudal of the Guahariboes, Spanish soldiers pretend to have found the fine kind of saussurite (*amazon stone*), of which we have spoken above. This tradition however is very uncertain; and the Indians, whom I interrogated on the subject, assured me, that the green stones, called *piedras de Macagua** at Esmeralda, were purchased from the Guaicas and

* See above, p. 383. The etymology of this name, which is unknown to me, might lead to the knowledge of the spot, where these stones are found. I have sought in vain the name of Macagua among the numerous tributary streams of the Tacutu, the Mahu, the Rupunury, and the Rio Trombetas.

Guahariboes, who traffic with hordes much farther to the east. The same circumstances take place respecting these stones, as with so many other valuable productions of the Indies. On the coast, at the distance of some hundred leagues, the country where they are found is positively named; but when the traveller with difficulty penetrates into this country, he discovers, that the natives are ignorant even of the name of the object of his research. It might be supposed, that the amulets of saussurite found in the possession of the Indians of the Rio Negro come from the Lower Maragnon, while those that are received by the missions of the Upper Oroonoko and the Rio Carony come from a country situate between the sources of the Essequibo and the Rio Branco. Yet, neither surgeon Hortsmann, a native of Hildesheim, nor don Antonio Santos, whose journal I examined, had seen the *amazon stone* in it's natural place; and the opinion that this stone is taken in a soft state like paste from the little lake Amucu, transformed into *Laguna del Dorado*, though very prevalent at Angostura, is wholly without foundation. A fine geographic discovery remains to be made in the eastern part of America, that of finding in a primitive soil a rock of euphotide containing the *piedra de Macagua*.

I shall here proceed to give some information respecting the tribes of dwarf and fair Indians,

which ancient traditions placed for centuries near the sources of the Oroonoko. I had an opportunity of seeing some of these Indians at Esmeralda, and can affirm, that the shortness of the Guaicas *, and the fairness of the Guahariboes, whom Father Caulin † calls *Guaribos blancos*, have been alike exaggerated. The Guaicas, whom I measured, were in general from four feet seven inches to four feet eight inches high (ancient measure of France). We were assured, that the whole tribe were of this extreme littleness; but we must not forget, that what is called a tribe constitutes, properly speaking, but one family. The exclusion of all foreign mixture contributes to perpetuate varieties, or the aberrations from a common standard. The Indians of the lowest stature next to the Guaicas are the Guainares and the Poignaves. It is singular, that all these nations are found close to the Caribbees, who are remarkably tall. They all inhabit the same climate, and subsist on the same aliment. They are varieties in the race, which no doubt existed previously to the settle-

* It appears, that there are Guaicas also to the north-east of Esmeralda, near the Rio Cuyuni, in the missions of the Capuchins. *Caulin*, p. 57.

† He places them at the sources of the *Canno* Amaguaca. (Corogr., p. 81). They now wander more to the north-east, near the Great Cataract, above the Gehette and the Chiguire. Gili (vol. i, p. 334) calls them in Italian, *Guaivi bianchi*.

ment of these tribes, (tall and short, fair and dark brown) in the same country. The four nations of the Upper Oroonoko, that appeared to me to be the fairest, are the Guahariboes of the Rio Gehette, the Guainares of the Ocamo, the Guaicas of *Canno* Chiguire, and the Maquiritares of the sources of the Padamo, the Jao, and the Ventuari. It being very striking to see natives with a fair skin beneath a burning sky, and amid nations of a very dark hue, the Spaniards have forged two daring hypotheses, in order to explain this phenomenon. Some assert, that the Dutch of Surinam and the Rio Esquibo may have intermingled with the Guahariboes and the Guainares; others insist, from hatred to the Capuchins of the Carony, and the Observantins of the Oroonoko, that the fair Indians are what are called in Dalmatia * *muso di frate*, children whose legitimacy is somewhat doubtful. In both cases the *Indios blancos* would be mestizoes, sons of an Indian woman and a white man. Now, having seen thousands of mestizoes, I can assert, that this comparison is altogether inaccurate. The individuals of the fair tribes, whom we examined, have the features, the stature, and the smooth, straight, black hair, which characterizes other Indians. It would be impossible to take them for a mixed race, like the

* At Cataro and Ragusa.

descendants of natives and Europeans. Some of these people are very little, others of the ordinary stature of the copper-coloured Indians. They are neither feeble, nor sickly, nor *albinoes;* and they differ from the copper-coloured races only by a much less tawny skin. It would be useless after these considerations, to insist on the distance of the mountains of the Upper Oroonoko from the shore inhabited by the Dutch. I will not deny, that descendants of fugitive Negroes *(negros alzados del palenque)* may have been seen among the Caribbees, at the sources of the Esquibo; but no white man ever went from the eastern coast to the Rio Gehette and the Ocamo in the interior of Guyana. It must also be observed, although we may be struck with the singular union of fair tribes at one point to the east of Esmeralda, it is no less certain, that tribes have been found in other parts of America, distinguished from the neighbouring tribes by the colour of their skin being much less tawny. Such are the Arivirianoes and Maquiritares of the Rio Ventuario and the Padamo, the Paudacotoes and Paravenas of the Erevato, the Viras and Ariguas of the Caura, the Mologagoes of Brazil, and the Guayanas of the Uruguay *.

* The Cumangotoes, the Maypures, the Mapojoes, and some hordes of the Tamanacs, are also fair, but in a less

The whole of these phenomena are so much the more worthy of attention, as they are displayed in that great branch of the American nations, that is generally opposed to the circumpolar branch, to that of the Tschougaz-Eski-

degree than the tribes I have just named. We may add to this list (which the researches of Sommering, Blumenbach, and Prichard, on the varieties of the human species, have rendered so interesting) the Ojes of the Cuchivero, the Boanes (now almost destroyed) of the interior of Brazil, and in the north of America, far from the north-west coast, the Mandans and the Akansas (*Walkenaer Geogr.*, p. 645. Gili, vol. ii, p. 34. *Vater, Amerikan. Sprachen*, p. 81. *Southey*, vol. i, p. 603.) The most tawny, we might almost say the blackest of the American race, are the Otomacs and the Guamoes. These have perhaps given rise to the confused notions of American Negroes, spread through Europe in the first ages of the conquest. (Herera, Dec. i, lib. 3, cap. 9, vol. i, p. 79. *Garcia, Origen de los Americanos*, p. 259.) Who are those *Negros de Quareca*, placed by Gomara, p. 277, in that very isthmus of Panama, whence we received the first absurd tales of an American people of Albinoes? In reading with attention the authors of the beginning of the 16th century, we see, that the discovery of America, which was that of a new race of men, had singularly awakened the interest travellers took respecting the varieties of our species. Now, if a black race had been mingled with copper coloured men, as in the South-sea Islands, the *conquistadores* would not have failed to speak of it in a precise manner. Besides, the religious traditions of the Americans relate the appearance, in the heroic times, of white and bearded men as priests and legislators; but none of these traditions make mention of a black race.

moes *, whose children are fair, and who acquire the Mungal or yellowish tint only from the influence of the air and the dampness. In Guyana, the hordes that live in the midst of the thickest forests are generally less tawny than those, that inhabit the shores of the Oroonoko, and are employed in fishing. But this slight difference †, which is alike found in Europe between the artisans of towns and the cultivators of the fields or the fishermen on the coasts, no way explains the problem of the *Indios blancos*, the existence of those American tribes with the skin of Mestizoes. These are surrounded with other Indians of the woods *(Indios del monte)*, who are of a reddish-brown, although now exposed to the same physical influences. The causes of these phenomena are very ancient, and

* See chap. 9, vol. iii, p. 290—298. The Chevalier Gieseke has recently confirmed all that Crantz had related of the colour of the skin of the Eskimoes. This race (even in the latitude of seventy-five and seventy-six degrees, where the climate is so rigorous) is not in general so diminutive as it was long believed to be. *Ross, Voyage to the North*, p. 127.

† Gomara (p. 278) has expressed himself on this point with that precision, which distinguishes his style, and his manner of painting objects. " Los Indios son leonados o membrillos cochos, o tiriciados o castaños *por naturaleza y no por desnudez*, como pensavan muchos, aunque *algo* les ayuda para ello ir desnudos."

we may repeat with Tacitus; *est durans originis vis.*

These tribes with a fair complexion, which we had an opportunity of seeing at the mission of Esmeralda, inhabit part of a mountainous country, that extends between the sources of six tributary streams of the Oroonoko, the Padamo, the Jao, the Ventuari, the Erevato, the Aruy, and the Paraguay *. The Spanish and Portugueze missionaries have the custom of designating this country more particularly by the name of *Parima.* Here, as in several other countries of Spanish America, the savages have reconquered what had been wrested from them by civilization, or rather by it's precursors, the missionaries. The expedition of the boundaries under Solano, and the extravagant zeal displayed by a governor of Guyana † for the discovery of Dorado, revived in the latter half of the eighteenth century, in some individuals, that spirit

* They are six tributary streams on the right bank of the Oroonoko; the first three run toward the south, or the Upper Oroonoko; the three others toward the north, or the Lower Oroonoko. The word Parima, which signifies *water, great water,* is applied sometimes, and more especially, to the land bathed by the Rio Parima, or Rio Branco (*Rio de Aguas Blancas*), a stream running into the Rio Negro; sometimes to the mountains (Sierra Parima), which divide the Upper and Lower Oroonoko.

† Don Manuel Centurion, Governador y Comendante general of Guyana from 1766 to 1777.

of enterprise, which characterized the Castilians at the period of the discovery of America. In going along the Rio Padamo, a road was observed across the forests and savannahs, ten days journey long, from Esmeralda to the sources of the Ventuari; and in two days more, from these sources, by the Erevato, the missions on the Rio Caura were reached. Two intelligent and daring men, don Antonio Santos, and Captain Bareto, had established, with the aid of the Maquiritares, a chain of military posts on this line from Esmeralda to the Rio Erevato. They were houses of two stories *(casas fuertes)*, mounted with swivels, such as I have described above *, which figured as nineteen villages on the maps published at Madrid. The soldiers, left to themselves, exercised all kinds of vexations on the natives *(Indians of peace)*, who had cultivated spots around the *casas fuertes*; and these vexations being less methodical, that is to say, worse contrived, than those to which the Indians are by degrees accustomed in the missions, several tribes formed a league, in 1776, against the Spaniards. All the military posts were attacked on the same night, on a line of nearly fifty leagues in length. The houses were burnt, and many soldiers massacred; a very small number only owing their preservation to the pity of the Indian women. This nocturnal

* Chap. 23, p. 404.

expedition is still mentioned with horror. Concerted in the deepest silence, it was executed with that concert, which the natives of both Americas, skilful in concealing their hostile passions, know how to practise in whatever concerns their common interests. Since 1776 no attempt has been made to reestablish the road, which leads by land from the Upper to the Lower Oroonoko, and no white man has been able to pass from Esmeralda to the Erevato. It is certain however, that in the mountainous lands, between the sources of the Padamo and the Ventuari (near the sites called by the Indians Aurichapa, Ichuana, and Irique,) there are many spots with a temperate climate, and with pasturages capable of feeding a great number of cattle*. The military posts have been

* The following are the most precise notions I could obtain on the spot, which differ much from those that father Caulin had acquired in Spain, long after his return from the Lower Oroonoko. The road to the Erevato passed between the mountains of Duida and Maraguaca, near the sources of the Rio Guapo. The *military posts* were Macha, Mauracare, Maracune, Matapi on the banks of the Padamo, Cointinamo on a tributary stream of the Rio Padamo, Mereico, el Orejon, Aurichapa, Irique, Ichuana de la Savana, Maveina, and Periquete on the Upper Ventuario. As, from the extraordinary configuration of the land (see above, p. 451), a part of the Upper Oroonoko runs from east to west, in a direction parallel to the Lower Oroonoko, which flows from west to east, geographers, destitute of statements on the longitude of the confluent streams, several of which are in the same

very useful in preventing the incursions of the Caribbees, who, from time to time, carry off

meridian, have committed great errors in the respective places they assign to these streams. According to astronomical observations, (those especially, which I made on the 22d of May, and the 12th of June), the village of Esmeralda, on the Upper Oroonoko, is one degree eighteen minutes *west* of the town of Muitaco, or Real Corona, on the Lower Oroonoko; according to the maps of La Cruz and Surville, Esmeralda is 0° 25′ *east* of Real Corona. The confluence of the Rio Arui with the Lower Oroonoko is, according to the Spanish maps, on the meridian that cuts the Upper Oroonoko at the point of bifurcation: according to my astronomical observations, and the maps published since my voyage to the Oroonoko, the *meridian of the bifurcation* (that of the origin of the Cassiquiare) crosses the Lower Oroonoko thirty-four leagues west of the mouth of the Arui, between the town of Alta Gracia and the confluence of the Cuchivero. Now, on connecting the mouth of the Rio Caura with the farm of Capuchino and Real Corona, two points, the situation of which I determined directly, we find it to be in the longitude of 67° 42′, or at most 67° 45′. A road traced from Padamo to the mouth of the Rio Caura would go to the *north east*, instead of going to the *north west*, as the maps of La Cruz and Surville indicate. This result is very important for ascertaining the situation of the sources of the Ventuari and the Erevato. As the geographers who have preceded me place the mouth of the Padamo forty minutes farther east of the bifurcation of the Oroonoko than it really is, they find this mouth not 0° 26′ to the *west*, as in my Atlas of South America, but 2° 10′ *east* of the confluence of the Caura. We are indeed ignorant of the difference of longitude between the mouth of the Rio Caura and that point of the Erevato (a tributary stream of the Caura), at which the ancient road from Esmeralda terminated; but it is difficult

slaves, though in very small numbers, between the Erevato and the Padamo. They would have resisted the attacks of the natives, if, instead of leaving them isolated, and solely dependant on the soldiers, they had been formed into communities, and governed like the villages of neophyte Indians.

We left the mission of Esmeralda on the 23d of May. Without being ill, we felt ourselves in a state of languor and weakness, caused by the torment of insects, bad nourishment, and a long voyage, in narrow and damp boats. We had not gone up the Oroonoko beyond the mouth of the Rio Guapo, which we should have done, if we could have attempted to reach the sources of the river. In the present state of things, private individuals, who are permitted to enter the missions, should confine their journey to the pacific part of the country. There remain fifteen leagues from the Guapo to the Raudal of the Guahariboes. At this cataract, which is passed on a bridge of lianas, Indians are posted armed with bows and arrows, who prevent the whites, or

to believe, that the Upper Erevato is found in nature carried so far back toward the *west*, that the direction of the road from Padamo to the Erevato should be *north west*. What is more certain, and very remarkable, on account of the position of the mouth of the Ventuari (1° 36′ *west* of Esmeralda), is, that we find the sources of the Ventuari, or rather the upper part of it's course, in the direction of the road from the Padamo to the Erevato.

those who come from the territory of the whites, from advancing toward the west. How could we hope to pass a point, where the commander of the Rio Negro, don Francisco Bovadilla was stopped, when, accompanied by his soldiers, he tried to penetrate beyond the Gehette? The carnage then made among the natives has rendered them more distrustful, and more averse to the inhabitants of the missions. It must be remembered, that the Oroonoko had hitherto offered to geographers two distinct problems, alike important, the situation of it's sources, and the mode of it's communication with the Amazon. The latter of these problems formed the object of the journey, which I have described: with respect to the discovery of the sources, this remains to be completed by the Spanish and Portugueze governments. A small detachment of soldiers, proceeding from Angostura or the Rio Negro, would be sufficient to resist the Guahariboes, the Guayras, and the Caribbees, whose force and numbers are alike exaggerated in the missions. This expedition might proceed either from Esmeralda toward the east, or by the Rio Caroni and the Paragua toward the south-west, or lastly, by the Rio Padaviri, or the Rio Branco and the Urariquera, toward the north-west. As the Oroonoko is probably not known near it's origin by this name, or by that of Paragua *, the

* This is the Indian name of the Upper Oroonoko. (See

surest course would be, to go beyond the Gehette, after having crossed the country between Esmeralda and the Raudal of the Guahariboes, of which I have given above a particular description. By this means the principal trunk of the river would not be confounded with an upper tributary stream, and the traveller would continue to go up the Oroonoko, along one bank or the other, where the bed was obstructed by rocks. If however, instead of going toward the east, he would seek the sources directing his course toward the west, by the Rio Carony, the Essequibo, or the Rio Branco, the object of the expedition could not be considered as attained, unless he descended that river, which he supposed to be identified with the Oroonoko, as far as the mouth of the Gehette and the mission of Esmeralda. The Portugueze fort of San Joaquim, on the left bank of the Rio Branco, near the confluence of the Tacutu, would be another point of departure favourably situate; and which

above, p. 219.) As the words *Paragua* and *Parima* signify *water, great water, sea, lake,* we must not be surprised, if streams entirely independant of each other bear these names. The Spaniards give the name of *Paragua* to that tributary stream of the Rio Carony, which receives the Paruspa, by which the Caribbees proceeded formerly into the valley of Caura. The Portugueze give the name of the Rio Parima sometimes to the whole of the Rio Branco (Rio de Aguas blancas) itself, sometimes to a small tributary stream of this river.

I recommend, because I am ignorant whether the mission of Santa Rosa, established more to the west on the banks of the Urariapara, under the government of don Manuel Centurion, at the time of the foundation of the *Ciudad* de Guirior, still exists *. The surest manner of arriving at the sources of the Oroonoko would be by following the course of the Paragua to the west from the *destacamento*, or military post, of Guirior, situate in the missions of the Catalan Capuchins, or proceeding toward the west, from the Portugueze fort of San Joaquim, in the valley of the Rio Uruariquera. The observations of the longitude, which I made at Esmeralda, may facilitate this research, as I have shown in

* The name of Santa Rosa is found on the most recent maps of the dépôt at Rio Janeiro, which are very minute on the northern part of the Rio Branco. The Urariapara falls into the Rio Urariquera (the Curaricara of Surville's map), which receives the little Rio Parima, and which, with the Tacutu, forms, near the fort of San Joaquim, the Rio Branco. As the Urariquera flows from east to west, it is in going up this river that you approach nearest to Esmeralda and the source of the Oroonoko. On the north of the Urariquera, the Cordillera of Pacaraimo, which was crossed by Don Antonio Santos, also stretches itself in the direction of the latitude. It forms the point of division between the waters of the Rio Branco, and those of the Essequibo and the Carony, (See above, p. 480.) An assemblage of huts, pompously called *Ciudad de Guirior*, stands on the Rio Paragua (a tributary steam of the Carony), where it receives the Paraguamusi.

a memoir addressed to the Spanish ministry during the reign of Charles the Fourth.

If in the great and useful establishment of the American missions those improvements were gradually made, which have been demanded by several bishops; if, instead of recruiting missionaries at hazard in the Spanish convents, young ecclesiastics were prepared for these functions in seminaries or colleges of missions founded in America; the military expeditions, which I propose, would become useless. The habit of Saint Francis, whether brown, like that of the Capuchins of Carony, or blue, like the habit of the Observantins of the Oroonoko, has still a certain charm for the Indians of those countries. They annex to this habit I know not what ideas of prosperity and comfort, the hope of acquiring hatchets, knives, and implements for fishing. Even those, who, proud of their independance and their separate state, refuse to suffer themselves to be "governed by the sound of the bell," receive with pleasure the visit of a neighbouring missionary. What has driven the natives from the banks of the river was the exactions of the soldiers, and the hostile incursions of the monks; the *entradas* and *conquistas apostolicas*. By renouncing the unreasonable system of introducing the customs of convents into the forests and savannahs of America, by leaving the Indians to enjoy the fruits of their labours, and by govern-

ing them less, that is by not shackling every instant their natural liberty, the missionaries would see the sphere of their activity, which ought to be that of civilization, rapidly increase. Monastic establishments have diffused in the equinoxial part of the New World, as in the north of Europe, the first germes of social life. They still form a vast zone around the European possessions; and, whatever abuses may have crept into institutions, where all power is confounded in one, they would be with difficulty replaced by others, which, without producing more serious inconveniences, would be as little chargeable, and as well adapted to the silent phlegm of the natives. I shall recur again to these settlements, the political importance of which is not sufficiently understood in Europe. It will be sufficient here to observe, that expeditions of discovery accompanied by an armed force would be useless, were the government and the bishops to employ themselves seriously in the melioration of the missions. The Christian settlements the most distant from the coast are at present the most neglected. The poor monks are left in absolute want. Occupied in acquiring subsistence, making unceasing efforts to be placed in some mission less remote from civilization, that is from *white and rational people**, they are little tempted to go forward.

* See above, p. 269.

Their progress would become rapid, if (after the example of the Jesuits) extraordinary succours were assigned to the most distant missions; and if the most courageous and intelligent ecclesiastics, and those best versed in the Indian languages, were placed in the most advanced posts, at Guirior, San Luis del Erevato, and Esmeralda *. The little that remains to be discovered of the Oroonoko (probably a space of twenty-five or thirty leagues) would then be soon explored; for in both Americas the missionaries arrive every where first, because they find facilities, which are wanting to every other traveller. "You boast of your journeys beyond Lake Superior," said an Indian of Canada to some fur traders of the United States; "you forget then, that the *black coats* passed it long before you; and that it was they who showed you the way to the west."

Our canoe was not ready to receive us till near three o'clock in the afternoon. It had been filled with an innumerable quantity of ants during the navigation of the Cassiquiare; and the *toldo*, or roof of palm-leaves, beneath which we had again to remain stretched out during twenty-two days, was freed with difficulty from these

* These three points are on the confines of the missions of the Rio Carony, the Rio Caura, and the Upper Oroonoko.

insects. We employed part of the morning in repeating to the inhabitants of Esmeralda the questions, which we had already put to them on the existence of a lake toward the east. We showed copies of the maps of Surville and La Cruz to old soldiers, who had been posted in the mission ever since it's first establishment. They laughed at the pretended communication of the Oroonoko with the Rio Idapa, and at the *White Sea,* which the former river was supposed to cross. What we politely call geographical fictions, appeared to them *lies of the other world (mentiras de por allà).* These good people could not comprehend, how men, in making the map of a country, which they had never visited, could pretend to know things in minute detail, of which persons who lived on the spot were ignorant. The lake Parima, the Sierra Mey, the springs that separate at the point where they issue from the earth, were entirely unknown at Esmeralda. We were repeatedly assured, that no one had ever been to the east of the *Raudal* of the Guahariboes; and that beyond this point, according to the opinion of some of the natives, the Oroonoko descends like a small torrent from a group of mountains, inhabited by the Coroto Indians. I urge these circumstances, because, if at the time of the royal expedition of the boundaries, or after that memorable occasion, any white man had actually reached the sources of

the Oroonoko, and the pretended lake Parima, the tradition would have been preserved in the nearest mission, which must have been passed in order to make so important a discovery. Now the three persons, who had knowledge of the labours of the expedition of the boundaries, Father Caulin, La Cruz, and Surville, have published notions on the origin of the Oroonoko, that are diametrically opposite to each other. How could these contradictions have existed, if, instead of having founded their maps on calculations and hypotheses framed at Madrid, those learned men had had before their eyes the narrative of one real journey. Father Gili, who had inhabited the banks of the Oroonoko during eighteen years *, when the expedition of the boundaries arrived, says expressly: "that don Apollinario Diez was sent in 1765, to attempt the discovery of the source of the Oroonoko; that he found the river, east of Esmeralda, full of shoals; that he returned for want of provision; and that he learned nothing, absolutely nothing, of the existence of a lake." This assertion is in perfect conformity with what I heard myself thirty-five years later at Esmeralda, where the name of don Apollinario is still in the mouths of all the inhabitants, and whence journeys are making continually beyond the con-

* From 1749 to 1767, *Gili*, vol. i, p. 19 and 324.

fluence of the Gehette. The probability of a fact is powerfully shaken, when it can be proved to be totally unknown on the very spot, where it ought to be known best; and when those, by whom it is related, contradict each other, not in the least essential circumstances, but in all that are the most important. I will enlarge no longer on a discussion merely geographical; I shall here show, how the errors of the modern maps have arisen from the habit of constructing them upon the ancient maps; how portages have been taken for branchings of rivers; how rivers, called by the Indians *great waters*, have been transformed into lakes; how two of these lakes (Cassipa and Parima), have been confounded and misplaced since the sixteenth century; finally, how we find in the names of the tributary streams of the Rio Branco the key of the greater part of these superannuated fictions.

We were surrounded, when we embarked, by those inhabitants, who call themselves whites and of Spanish race. These poor people conjured us, to solicit from the governor of Angostura their return to the steppes (*Llanos*), or, if this favour were refused, their removal to the missions of the Rio Negro, as to a cooler climate, more free from insects. "However great may have been our faults," said they, "we have expiated them by twenty years of torments amid this swarm of *moustiques*." I pleaded the cause

of these proscribed men in a report made to the government on the state of industry and commerce in those countries. My efforts were fruitless; the government at the period of my voyage was indeed moderate, and generally inclined to mild measures; but they, who are acquainted with the complicated machinery of the ancient Spanish monarchy, know how little the spirit of the ministry concerned itself in the well-being of the inhabitants of the Oroonoko, New California, and the Philippine Islands.

When travellers attend only to the sensations they feel, they dispute with each other on the abundance of the moschettoes, as on the progressive increase or diminution of the temperature. The state of our organs, the motion of the air, it's degree of humidity or dryness, it's electric intensity, a thousand circumstances contribute at once, to make us suffer more or less from the heat and the insects. My fellow travellers thought unanimously, that Esmeralda was more tormented by moschettoes than the banks of the Cassiquiare, and even than the two missions of the Great Cataracts: as I was less sensible than they of the high temperature of the air, it appeared to me, that the irritation produced by the insects was somewhat less at Esmeralda, than at the entrance of the Upper Oroonoko. We made use of cooling lotions; the juice of limes, and still more that of the

pine-apple, perceptibly moderated the itching of old stings: without diminishing the swellings, they rendered them less painful. When you hear the complaints, that are made of these tormenting insects in hot countries, it is difficult to believe, that their absence, or rather their sudden disappearance, could become a subject of inquietude. The inhabitants of Esmeralda related to us, that in the year 1795, an hour before sunset, when the moschettoes form a very thick cloud, the air was suddenly free from them during twenty minutes. Not one insect was perceived, although the sky was without clouds, and no wind announced rain. It is necessary to have lived in those countries, to comprehend the degree of surprise, which the sudden disappearance of the insects must have produced. The inhabitants congratulated each other, and inquired, whether this state of happiness, this relief from pain (*felicidad y alivio*), could be of any duration. But soon, instead of enjoying the present, they yielded to chimerical fears, and imagined, that the order of nature was perverted. Some old Indians, the sages of the place, asserted, that the disappearance of the insects must be the precursor of a great eathquake. Warm disputes arose; the least noise amid the foliage of the trees was listened to with an attentive ear; and when the air was again filled with moschettoes, they were almost hailed with plea-

sure. We could not guess what modification of the atmosphere had caused this phenomenon, which must not be confounded with the periodical replacing of one species of insects by another. The animated recital of the natives, however, fixed our attention: we fancied we saw man distrustful, uncertain with what he is menaced, regretting his accustomed sufferings.

The weather, when we left Esmeralda, was very stormy. The summit of Duida was enveloped in clouds, but this mass of vapours, so black, and so strongly condensed, still supported itself at the height of nine hundred toises above the surrounding plains. In judging of the mean elevation of the clouds, that is of their lower stratum in different zones, we must not confound the sporadic or solitary group with that sheet of vapours, which, extending in a continued body above the plains, terminates at a chain of mountains. It is these sheets of vapours only, which can be considered as giving any certain results; solitary groups of clouds are often ingulfed in the vallies by the sole effect of descending currents. We saw clouds near the town of Caraccas* at five hundred toises above

* Below the Cross of la Guayra. (See vol. iii, p. 581; and *Obs. Astr.*, vol. i, p. 296.) I have entered into these particulars on the height of clouds, to show how much it is to be desired, that this height had been oftener determined by aerostatic voyages. When the balloon ascends in the midst

the level of the sea; yet we cannot easily admit, that the clouds above the coast of Cumana and the island of Margaretta sustain themselves at so small a height. The storm which growled around the top of Duida did not descend into the valley of the Oroonoko; we did not in general observe in that valley those strong electric explosions, which almost every night, during the rainy season, alarm the traveller along the Rio Magdalena, in going up from Carthagena to Honda. It would seem as if the storms in a flat country followed the furrow or bed of a large river more regularly than in a country unequally studded with mountains, and exhibiting various branchings of lateral valleys. We repeatedly examined the temperature of the water of the Oroonoko at it's surface, while the ther-

of a plain, you are sure of obtaining results, that are independant of the local effect which has just been mentioned. Gay-Lussac and Biot, in their aerostatic ascents, found the inferior limit of the clouds above Paris at six hundred toises, in the great heats of summer. The fogs, in which you are so frequently enveloped at Xalapa, on the eastern declivity of the Cordillera of Mexico, led me to admit formerly, that the mean height of the clouds above Vera Cruz was only seven hundred toises; but the proximity of woody and damp mountains, the radiation from the soil and leaves during the night in a serene sky, and the electric conductibility of the rock, render those conclusions somewhat uncertain, that are drawn from the measure of the height of clouds adhering to mountains.

mometer in the air kept up at 30·3°; it was only 26° centesimal, consequently 3° lower than at the Great Cataracts, and 2° higher than the waters of the Rio Negro. In the temperate zone in Europe, the Danube and the Elbe* attain in the middle of summer only from 17° to 19°. I could never find a difference at the Oroonoko between the diurnal and nocturnal heat of the waters, except when I plunged the thermometer into shallow parts of the river, where it flows with extreme slowness over a wide, sandy beach, as at Uruana, and toward the mouth of the Apure. Although in the forests of Guyana, the radiation from the soil is much slackened beneath a sky constantly cloudy, the temperature of the air diminishes sensibly during the night. The upper stratum of water is then hotter than the surrounding soil; and if the mingling of two portions of air almost satu-

* The following are the differences founded on direct experiments made before my departure from Europe, during a long residence at Vienna and Dresden.

Latitude 48—49°.	*Latitude* 5—8°.
Temperature of the rivers in summer, 17—19° cent.	26—29°. (The Oroonoko.)
Temperature of the air in the hottest month, 18—19·5°.	28—29°.
Mean temperature of the year, 10—12°.	27—28°.

rated* with moisture, resting on the forest and on the bed of the river, produce no perceptible mist, it is difficult to attribute this circumstance to the little coolness of the night†. During my abode on the banks of the Oroonoko and the Rio Negro, the water of these rivers was often from two to three degrees hotter than the nocturnal temperature of the air unagitated by the wind.

After four hours navigation in going down the Oroonoko, we arrived at the point of the bifurcation. Our resting place was on the same beach of the Cassiquiare, where a few days before our great dog had probably been carried off by the jaguars. All the researches made by the Indians to discover some traces of this animal were fruitless. The sky remaining cloudy, I waited in vain for the stars, but I repeated the observation of the magnetic dip, which I had

* See vol. ii, p. 92; and p. 85 of the present volume.

† See the interesting papers of Sir Humphrey Davy on the formation of fogs. (*Phil. Trans.*, 1819, P. I, p. 211.) At the Great Cataracts the air at night was between twenty-seven and twenty-nine degrees, and the water of the Oroonoko at 27·6°; but on the banks of the Rio Negro, I have seen the cent. thermometer sink at night, in the air, to 22°, and the surface of the river keep at 24°. (See above, p. 165 and 344.) Thus at the Lower Oroonoko, east of the mouth of the Apure, where the breeze blows freely, the water of the river is generally at 28° while the nocturnal temperature of the air sinks to 25° or lower.

made at Esmeralda. I had found it at the foot of Duida 28·25° div. cent., almost 3° more than at Mandavaca. I obtained at the mouth of the Cassiquiare 28·75°; the influence of Duida therefore appeared to be imperceptible. The cries of the jaguars * were heard during the whole night. They are extremely frequent in those countries, between the *Cerro* Maraguaca, the Unturan, and the banks of the Pamoni. There also is found that *black tiger* †, of which I saw some fine skins at Esmeralda. This animal is celebrated for it's strength and ferocity; it appears to be still larger than the common jaguar. The black spots are scarcely visible on the dark-brown ground of it's skin. The Indians assert, that these tigers are very rare, never mingle with

* This frequency of large jaguars is somewhat remarkable in a country destitute of cattle. The tigers of the Upper Orooonoko lead a wretched life in comparison of those of the *Pampas* of Buenos Ayres and the *Llanos* of Caraccas, covered with herds of cattle. More than four thousand jaguars are killed annually in the Spanish colonies, several of them equalling the mean size of the royal tiger of Asia. Two thousand skins of jaguars were formerly exported annually from Buenos Ayres alone; they are called by the furriers of Europe skins of the great panther.

† Gmelin in his Synonima, seems to confound this animal by the name of felis discolor with the great American lion, felis concolor, which is very different from the little lion (puma) of the Andes of Quito. (*Lin. Syst. Nat.* vol. i, p. 79. *Cuvier, Regne animal*, vol. i, p. 160.)

the common jaguars, and " form another race." I believe, that Prince Maximilian of Neuwied, who has enriched American zoology by so many important observations, acquired the same notions farther to the south, in the hot part of Brazil. *Albino* varieties of the jaguar have been seen in Paraguay: for the spots of these animals, which might be called the beautiful panthers of America, are sometimes so pale, as to be scarcely distinguishable on a very white ground. In the black jaguars, on the contrary, it is the colour of the ground that makes the spots disappear. It requires to have lived long in those countries, and to have accompanied the Indians of Esmeralda in the perilous chace of the tiger, to pronounce with certainty upon the varieties and the species. In all the mammiferæ, and particularly in the numerous family of the apes, we ought, I believe, to fix our attention less on the passage from one colour to another in the individuals, than on their habit of separating themselves, and forming distinct bands.

May the 24th. We left our resting place before sunrise. In a rocky cove, which had been the dwelling of some Durimundi Indians, the aromatic odour of the plants was so powerful, that, although sleeping in the open air, and having our nervous system rendered little irritable, in consequence of the habits of a life exposed to fatigues, we were incommoded by it.

We could not discover what the flowers were, that diffused this perfume. The forest was impenetrable: M. Bonpland believed, that large clumps of pancratium and other liliaceous plants were concealed in the neighbouring marshes. Descending the Oroonoko by the favour of the current, we passed first the mouth of the Rio Cunucunumo, and then the Guanami and the Puruname. The two banks of the principal river are entirely desert; lofty mountains rise toward the north, and on the south a vast plain extends far as the eye can reach beyond the sources of the Atacavi, which lower down takes the name of the Atabapo. There is something melancholy and painful in this aspect of a river, on which not even a fisherman's canoe is seen. Some independant tribes, the Abirianoes and the Maquiritares, dwell in the mountainous country; but in the neighbouring savannahs *, bounded by the Cassiquiare, the Atabapo, the Oroonoko, and the Rio Negro, there is now scarcely any trace of a human habitation. I say now; for here, as in other parts of Guayana, rude figures † representing the Sun, the Moon,

* They form a quadrilateral plot of a thousand square leagues, the opposite sides of which have contrary slopes, the Cassiquiare flowing toward the south, the Atabapo toward the north, the Oroonoko toward the north-west, and the Rio Negro toward the south-east.

† Compare vol. iv, p. 473; and p. 382 of the present volume.

and different animals, are traced on the hardest rocks of granite, and attest the anterior existence of a people, very different from those who became known to us on the banks of the Oroonoko. According to the accounts of the natives, and of the most intelligent missionaries, these symbolic signs resemble perfectly the characters we saw a hundred leagues more to the north, near Caycara, opposite the mouth of the Rio Apure.

We are the more struck with the remains of an ancient civilization, in proportion as they fill a wider space, and form a stronger contrast with the barbarism, in which since the conquest we find the hordes of the hot and oriental regions of South America. In advancing from the plains of the Cassiquiare and the Conorichite, one hundred and forty leagues toward the east, between the sources of the Rio Branco and the Rio Essequibo, we also meet with rocks with symbolical figures. I have lately verified this fact, which appears to me extremely curious, in the journal of the traveller Hortsmann, a copy of which I have before me in the hand-writing of the celebrated d'Anville. That traveller, whom I have several times had occasion to mention in this work, went up the Rupunuvini*, one of the

* This word no doubt signifies *water* (*veni, oueni*) of Rupununi, or Rupunuri. (See above, p. 480). *Veni* is a word of

tributary streams of the Essequibo. Where this river, full of small cascades, winds between the mountains of Macarana, he found *, before he reached lake Amucu, " rocks covered with figures, or (as he says in Portugueze) with *varias letras*." We do not take this word *letters* in it's real signification. We were also shewn near the rock Culimacari, on the banks of the Cassiquiare, and at the port of Caycara in the Lower Oroonoko, traces, which were believed to be regular characters. They were however only mishapen figures, representing the heavenly bodies, and tigers, crocodiles, boas, and instruments used for the fabrication of the flour of cassava. It was impossible to recognize in these *painted rocks*† (the name by which the

the great branch of the Maypure, Cabre, Guaipunave, Avane, and Pareni tongues.

* April the 18th, 1740. Nicholas Hortsmann noted daily on the spot every thing, that appeared to him worthy of observation. He deserves confidence the more, as, being disappointed by the failure of the object of his researches (the lake Dorado, and the mines of gold and diamonds), he seems to regard with disdain every thing he met on his way.

† In Tamanac, *tepumereme*. (*Tepu*, a stone, rock; as in Mexican, *tetl*, a stone, and *tepetl*, a mountain; in Turcotatarian, *tepe*.) The Spanish Americans also call the rocks covered with sculptured figures *piedras pintadas*; those for instance, which are found on the summit of the Paramo of Guanacas, in New Grenada, and which recall to mind the *tepumereme* of the Oroonoko, the Cassiquiare, and the Rupunuvini.

natives denote those masses loaded with figures) any symetrical arrangement, or characters with regular spaces. The traces discovered in the mountains of Uruana, by the missionary Fray Ramon Bueno, approach nearer to alphabetical writing; these very characters, however, which I have elsewhere discussed, still have many doubts*.

Whatever may be the meaning of these figures, and with whatever view they were traced upon granite, they do not less merit the attention of those, who occupy themselves with the philosophic history of our species. In travelling from the coast of Caraccas toward the equator, we are at first led to believe, that monuments of this kind are peculiar to the chain of mountains of Encaramada; they are found at the port of Sedeno, near Caycara†, at San Rafael del Capuchino, opposite Cabruta, and in almost every place where the granitic rock pierces the soil in the savannah, which extends from the Cerro Curiquima toward the banks of the Caura. The nations of the Tamanac race, the ancient inhabitants of those countries, have a *local* mythology, and traditions which relate to these sculptured rocks. *Amalivaca*, the father of the Tamanacs, that is the creator of the human race

* See vol. iv, p. 499; and my Views of the Cordilleras and Monuments of the Ancient Inhabitants of America, vol. i (or xiii of the present work), p. 153.

† In the mountains of the tyrant, *Cerros del tyrano.*

(for every nation regards itself as the root of the other nations), arrived in a bark, at the time of the great inundation, which is called the *age of water**, when the billows of the ocean broke against the mountains of Encamarada in the interior of the land. All mankind, or, to express myself better, all the Tamanacs, were drowned, with the exception of one man and one woman, who saved themselves on a mountain near the banks of the Asiveru, called Cuchivero by the Spaniards†. This mountain is the Ararat of the Aramean or Semitic nations, and the Tlaloc or Colhuacan of the Mexicans. *Amalivaca*, sailing in his bark, engraved the figures of the Moon and the Sun on the *Painted rock (Tepumereme)* of Encaramada. Some blocks of granite piled upon one another, and forming a kind of cavern, are still called the *house* or *dwelling* of the great forefather of the Tamanacs‡. The natives show also a large stone near this cavern, in the plains of Maita, which they say was an instrument of music, the *drum of Amalivaca*§. We must here observe,

* It is the *Atonatiuh* of the Mexicans, the fourth age, the fourth regeneration of the world. See my *Amer. Monum.* vol. ii (xiv of the present work), p. 63.

† See vol. iv, p. 472; and *Gili*, vol. ii, p. 234; vol. iii, p. 4, p. 18.

‡ *Amalivaca-jeutitpe.*

§ *Amalivaca-chambural.*

that this heroic personage had a brother, *Vochi*, who helped him to give the surface of the Earth it's present form. The Tamanacs relate, that the two brothers, in their system of perfectibility, sought at first, to arrange the Oroonoko in such a manner, that the current of the water could always be followed either going down or going up the river. They hoped by this means to spare men the trouble of rowing in proceeding toward the source of rivers; but, however great the power of these regenerators of the world, they could never contrive to give a double slope to the Oroonoko, and were compelled to relinquish this singular hydraulic system. Amalivaca had daughters, who had a decided taste for travelling. The tradition says, no doubt in a figurative style, that he broke their legs, to render them sedentary, and force them to people the land of the Tamanacs. After having regulated every thing in America, on that side of the *great water*, *Amalivaca* again embarked, and "returned to the other shore," to the same place from which he came. Since the natives have seen the missionaries arrive, they imagine, that Europe is this *other shore*; and one of them inquired with great simplicity of father Gili, whether he had seen the great Amalivaca *yonder*, the father of the Tamanacs, who had covered the rocks with symbolic figures.

These notions of a great cataclysm; of a cou-

ple saved on the summit of a mountain, and throwing behind them the fruits of the mauritia palm-tree, to repeople the Earth*; of that national divinity, *Amalivaca*, who arrived by water from a distant land, prescribed laws to nature, and forced the nations to renounce their migrations; these various features of a very ancient system of belief, are well worthy to fix our attention. What the Tamanacs, and the tribes whose languages are analogous to the Tamanac tongue, now relate to us, they have no doubt learned from other people, who inhabited before them the same regions†. The name of *Amalivaca* is spread over a region of more than five thousand square leagues; it is found designating *the father of mankind (our great grandfather)* as far as to the Caribbee nations‡, whose idiom approaches that of the Tamanac only in the same degree as the German approaches the Greek, the Persian, and the Sanscrit. *Amalivaca* is not originally the *Great Spirit*, the *Aged of Heaven*, that invisible being, whose worship springs from that of the powers of nature, when nations rise insensibly to the sentiment of the unity of these powers; he is

* See vol. iv, p. 472.

† The Parecas, Avarigotoes, Quiriquiripas, and Mariquitares.

‡ The Caribbees say *Amarivaca*, as they call themselves *Carina* and Calina (*Galibis*) by changing the *r* into *l*.

rather a personage of the heroic times, a man, who, coming from afar, lived in the land of the Tamanacs and the Caribbees, sculptured symbolical figures upon the rocks, and disappeared by going back to the country he had previously inhabited beyond the Ocean. The anthropomorphitism of the divinity has two sources* diametrically opposite; and this opposition seems to arise less from the various degrees of intellectual culture, than from the different dispositions of nations, some of which are more inclined to mysticism, and others more governed by the senses, and by external impressions. Sometimes man makes the divinities descend upon Earth, charging them with the care of ruling nations, and giving them laws, as in the fables of the East; sometimes, as among the Greeks and other nations of the West, they are the first monarchs, priest-kings, who are stripped of what is human in their nature to be raised to the rank of national divinities. *Amalivaca* was a stranger, like Manco-Capac, Bochica, and Quetzalcohuatl; those extraordinary men, who, in the alpine or civilized part of America, on the table lands of Peru, New Grenada, and Anahuac, organized civil society, regulated the order of sacrifices, and founded religious congregations. The Mexican Quetzalcohuatl,

* *Creuzer, Symbolik der alten Vœlker*, vol. iii, p. 89.

whose descendants Montezuma* thought he recognized in the companions of Cortez, displays an additional resemblance to Amalivaca, the mythologic personage of savage America, or the plains of the torrid zone. When advanced in age, the high-priest of Tula left the country of Anahuac, which he had filled with his miracles, to return to an unknown region, called Tlalpallan. When the monk Bernard de Sahagun arrived in Mexico, the same questions precisely were put to him, as those which were addressed to father Gili two hundred years later in the forests of the Oroonoko; he was asked, whether he came from the *other shore*, from the countries to which Quetzalcohuatl had retired†.

We have seen above, that the region of sculptured rocks, or of *painted stones*, extends far beyond the Lower Oroonoko, beyond the country (latitude 7° 5′ to 7° 40′; longitude 68° 50′ to 69° 45′) to which belongs what may be called the *local fable* of the Tamanacs. We again find these same sculptured rocks between the Cassiquiare and the Atabapo (lat. 2° 5′ to 3° 20′; long. 69° to 70°); and between the sources‡ of the Essequibo and the Rio Branco

* The second king of this name, of the race of Acamapitzin, properly called *Montezuma-Ilhuicamina.*

† *Torquemada,* vol. ii, p. 53.

‡ The situation indicated as long. 62° 32′ is properly that

(lat. 3° 50′; long. 62° 32′). I do uot assert, that these figures prove the knowledge of the use of iron, or that they denote a very advanced degree of culture; but even on the supposition, that, instead of being symbolical, they are the fruits of the idleness of hunting nations, we must still admit an anterior race of men, very different from those who now inhabit the banks of the Oroonoko and the Rupunuri. The more a country is destitute of remembrances of generations that are extinct, the more important it becomes to follow the least traces of what appears to be monumental. The eastern plains of North America display only those extraordinary circumvallations, that remind us of the fortified camps (the pretended cities of an immense extent) of the ancient and modern nomade tribes of Asia. In the oriental plains of South America, the force of vegetation, the heat of the climate, and the too lavish gifts of nature, have opposed obstacles still more powerful to the progress of human civilization. Between the Oroonoko and the Amazon I heard no mention of one wall of earth, one vestige of a dike, one sepulchral

of the confluence of the Pirara with the Rio Mahu, one of the upper branches of the Rio Branco. I found this situation on the difference of longitude which M. de la Condamine has given between the Para and the fort of Rio Negro, determining the mouth of the Rio Branco (long. 64° 38′) from the longitude of the fort.

tumulus; the rocks alone show us, and this through a great extent of country, rude sketches, which the hand of man has traced in times unknown, and which are connected with religious traditions. When both Americas shall be peopled by men, who regard with less disdain the soil that feeds them, the relics of former ages will be more numerous in our eyes from day to day. A feeble light will spread over the history of the barbarous nations, over these steep rocks, which tell us, that the regions now desert were heretofore inhabited by a race of more intelligent and active men.

Before I quitted the most savage part of the Upper Oroonoko, I thought it was proper to mention facts, which are important only when they are considered in their connection with each other. All I could relate of our navigation from Esmeralda to the mouth of the Atabapo would be merely a dry enumeration of rivers and uninhabited places. From the 24th to the 27th of May, we slept but twice on the land; our first resting place was at the confluence of the Rio Jao, and our second below the mission of Santa Barbara, in the island of Minisi. The Oroonoko being free from shoals, the Indian pilot made us navigate all night, abandoning the boat to the current of the river. This part of my map, between the Jao and the Ventuari, has consequently little accuracy in what regards the wind-

ings of the Oroonoko. Setting apart the time which we spent on the shore in preparing the rice and plaintains that served us for food, we took but thirty-five hours in going from Esmeralda to Santa Barbara. The chronometer gave me for the longitude of the latter mission 70° 3′; we had therefore made near four miles an hour, a velocity (of 1·05 toise in a second) which was partly owing to the current, and partly to the action of the oars. The Indians assert, that the crocodiles do not go up the Oroonoko above the mouth of the Rio Jao, and that the manatees are not even found above the cataract of Maypures. It is easy to be deceived respecting the first of these two animals; the traveller most habituated to see them may mistake a trunk of a tree twelve or fifteen feet long for a crocodile swimming with part of the head and tail only above the water.

The mission of Santa Barbara is situated a little to the west of the mouth of the Rio Ventuari, or Venituari, which was examined in 1800 by Father Francisco Valor. We found in this small village of one hundred and twenty inhabitants some traces of industry: but the produce of this industry is of little profit to the natives; it is reserved for the monks, or as they say in those countries, for the church and the convent. We were assured, that a great lamp of massive silver, purchased at the expense of the neophytes,

is expected from Madrid. Let us hope, that, after the arrival of this lamp, they will think also of clothing the Indians, of procuring for them some instruments of agriculture, and of assembling their children in a school. Although there are a few oxen in the savannahs round the mission, they are rarely employed in turning the mill *(trapiche)*, to express the juice of the sugar-cane; this is the occupation of the Indians, who work without pay, as they do every where when they are understood to work for the church. The pasturages at the foot of the mountains that surround Santa Barbara are not so rich as at Esmeralda, but superior to those at San Fernando de Atabapo. The grass is short and thick, yet the upper stratum of earth furnishes only a dry and parched granitic sand. The savannahs, far from fertile, of the banks of the Guaviare, the Meta, and the Upper Oroonoko, are equally destitute of that mould, which abounds in the surrounding forests, and of the thick stratum of clay, that covers the sandstone of the *Llanos*, or steppes, of Venezuela. The small herbaceous mimosas contribute in this zone to fatten the cattle, but are very rare between the Rio Jao and the mouth of the Guaviare.

During the few hours of our stay at the mission of Santa Barbara, we obtained pretty accurate ideas respecting the Rio Ventuari, which,

next to the Guaviare, appeared to me to be the most considerable tributary stream of the Oroonoko. It's banks, heretofore occupied by the Maypures, are still peopled by a great number of independant nations. On going up by the mouth of the Ventuari, which forms a delta covered with palm-trees *, you find on the east, after three days journey, the Cumaruita and the Paru, two streams that rise at the foot of the lofty mountains of Cuneva. Higher up, on the west, lie the Mariata and the Manipiare †, inhabited by the Macoes and Curacicanas. The latter nation is remarkable for the ardour with which it cultivates cotton. In a hostile incursion (*entrada*) a large house was found containing more than thirty or forty hammocks of a very fine texture of spun cotton, cordage, and fishing implements. The natives had fled; and Father Valor informed us, "that the Indians of the mission, who accompanied him, had set fire to the house, before he could save these productions of the industry of the Curacicanas." The neophytes of Santa Barbara, who think themselves very superior to these pretended savages, appeared to me far less industrious. The Rio Manipiare, one of the principal branches of the

* *Palma del Cucurito.*

† Rio Manapiari, according to the pronunciation of the Indians of Esmeralda.

Ventuari, approaches near it's source those lofty mountains, the northern ridge of which gives birth to the Cuchivero. It is a prolongation of the chain of Baraguan; and there Father Gili places the *table-land of Siamacu*, of which he vaunts the temperate climate*. The upper course of the Rio Ventuari, beyond the confluence of the Asisi and the *Great Raudales*, is almost unknown. I was informed only, that the Upper Ventuari bends so much toward the east †, that the ancient road from Esmeralda to the Rio Caura crosses the bed of the river. The proximity of the tributary streams of the Carony, the Caura, and the Ventuari, has facilitated for ages the appearance of the Caribbees on the banks of the Upper Oroonoko. Bands of this warlike and trading people went up from the Rio Carony, by the Paragua, to the sources of the Paruspa. A portage conducted them to the Chavarro, an eastern tributary stream of the Rio Caura; they descended with their canoes first this stream, and then the Caura itself, as far as the mouth of the Erevato. After having gone up this last river toward the southwest, and traversed vast savannahs for three days, they entered by the Manipiare into the great Rio Ventuari ‡. I trace this road with

* See above, p. 555. † See above, p. 572, note.

‡ The Rio Cuyuni, the Paragua, and the tributary streams of the Caura (the Chavarro and the Erevato), flow

precision, not only because it was that by which the traffic of native slaves was carried on, but also to call the attention of those men, who at some future day shall govern Guyana, to the high importance of this labyrinth of rivers.

It is by the four largest tributary streams, which the majestic river of the Oroonoko receives on the right, the Carony, the Caura, the Padamo, and the Ventuari, that European civilization will one day penetrate into this country of forests and mountains, which has a surface of 10,600 square leagues, and which is surrounded by the Oroonoko on the north, the west, and the south. The Capuchins of Catalonia, and the Observantins of Andalusia and Valentia, have already made settlements in the vallies of the Carony and the Caura. The tributary streams of the Lower Oroonoko, being the nearest to the coast and the cultivated region of Venezuela, were naturally the first to receive missionaries,

more or less in the direction of the latitude; so that, with the exception of a few portages, there is a navigation from east to west, going from Essequibo and Demerary, for a distance of one hundred and forty leagues, in the latitude of 6° and 7°. This navigation is performed in the interior, parallel to the course of the Lower Oroonoko, remaining from thirty to forty leagues distant from this great river to the south. This course may be compared in little to the great line of navigation established in Siberia from west to east, by the uniform direction of the tributary streams of the Obi, the Jenisei, and the Lena.

and with them some germes of social life. In 1797, the settlements of the Capuchins on the Rio Caroni already contained 16,600 Indians, peaceably inhabiting villages; while at the Rio Caura, under the government of the Observantins, there was at that period, according to enumerations alike official, only 640. This difference results from the vast extent and excellence of the pastures on the banks of the Caroni, the Upatu, and the Cuyuni, the proximity of the mouths of the Oroonoko, and of the capital of Guyana, to the missions of the Capuchins; and finally, from the interior government, the active industry, and the mercantile spirit of the Catalonian monks. Corresponding to the Caroni and the Caura, which flow toward the north, are two great tributary streams of the Upper Oroonoko, that send their waters toward the south; these are the Padamo and the Ventuari. No village has hitherto risen on their banks, though they offer advantages for agriculture and pasturage, which would be sought in vain in the valley of the immense river, to which they are tributary. In the centre of these savage countries, where there will long be no other road than the rivers, every project of civilization should be founded on an intimate knowledge of the *hydraulic system*, and the relative importance of the tributary streams.

In the morning of the 26th of May we left the

little village of Santa Barbara, where we found several Indians of Esmeralda, who had come with great regret, by order of the missionary, to construct a house for him of two stories. During the whole day we enjoyed the view of the fine mountains of Sipapo *, which rise at a distance of more than eighteen leagues toward the north-north-west. The vegetation of the banks of the Oroonoko is singularly varied in this part of the country; the arborescent ferns † descended from the mountains, and mingled with the palm-trees of the plain. We rested that night on the island of Minisi; and, after having passed the mouths of the little rivers Quejanuma, Ubua, and Masao, we arrived, on the 27th of May, at San Fernando de Atabapo. It was a month since we had lodged in the same house belonging to the president of the missions when going up the Rio Negro. We then directed our course toward the south, by the Atabapo and the Temi; we now returned from the west, having made a long circuit by the Cassiquiare and the Upper Oroonoko. During this long absence, the president of the missions had conceived serious inquietudes respecting the

* See above, p. 175.

† The geographical distribution of these plants is extremely singular. Scarcely any are found on the eastern coast of Brazil. (See the interesting work of Prince Maximilian of Neuwied, *Reise nach Brasilien*, vol. i. p. 274.)

real object of our journey, my connections with the higher clergy of Spain, and the knowledge I had acquired of the state of the missions. At the moment of our departure for Angostura, the capital of Guyana, he pressed me earnestly to leave a writing in his hands, bearing testimony to the good order, that prevailed in the Christian settlements on the Oroonoko, and the mildness with which the natives are generally treated. This proposition of the superior, arising from a praiseworthy zeal for the good of his order, embarrassed me a little. I answered, that the testimony of a traveller born in the bosom of the Calvinist church could scarcely have any weight in the interminable quarrels, which almost every where, in the New World, divide the secular and ecclesiastical powers. I hinted to him, that, being two hundred leagues from the coast, in the centre of the missions, and, as the inhabitants of Cumana say archly, *en el poder de los frayles* *, a writing, which we should compose together on the banks of the Atabapo, would not perhaps appear an act freely consented to on my part. The president was not alarmed at the idea of having treated with hospitality a Calvinist; the first, I believe, who had been seen in the missions of Saint Francis; but the missionaries in America cannot be accused of

* In the power of the monks.

intolerance. They are not occupied by the heresies of Europe, except perhaps on the confines of Dutch Guyana, where the preachers think proper also to go on missions. The president insisted no longer on the writing which I was to sign, and we availed ourselves of the few moments that remained, to discuss with frankness the situation of the country, and the hope of making the Indians participate in the benefits of civilization. I insisted on the evil, which had arisen from the *entradas*, or hostile incursions; on the little advantage, which the natives derived from the fruits of their labours; on the journeys which they were compelled to make for concerns that were not their own; finally, on the necessity of bestowing some education in a particular college on the young ecclesiastics, who were called to govern very numerous communities. The president seemed to listen to me placidly. I believe, however, he would have wished (no doubt from zeal for the sciences), that those who gather plants, and examine rocks, would renounce that indiscreet interest in the copper-coloured race, and in the affairs of human society in general. This desire is common enough in both worlds; and is found wherever authority is disquieted, because it believes itself not firmly seated.

We remained only one day at San Fernando de Atabapo, although this village, embellished

by the pihiguao palm-tree *, with fruit like peaches, appeared to us a delicious abode. Tame *pauxis* † surrounded the Indian huts; in one of which we saw a very rare monkey, that inhabits the banks of the Guaviare. This monkey is the *caparro*, which I have made known in my *Observations de Zoologie et d'Anatomie comparée* ‡, and which forms, as Mr. Geoffroy believes, a new genus (lagothrix) between the ateles, and the alouates. The hair of this monkey is a gray like that of the marten, and extremely soft to the touch. The *caparro* is distinguished by a round head, and a mild and agreeable expression of countenance. I believe the missionary Gili § is the only author, who has made mention before me of this curious animal, around which zoologists begin to group other monkeys of Brazil. Having quitted San Fernando May the 27th, we arrived, by favor of the rapid current of the Oroonoko, in seven hours at the mouth of the Rio Mataveni. We passed the night in the open air, under the granitic rock El Castillito ||, which rises in the middle of the

* See above, Chap. xxii, p. 213.

† Not the ourax of Cuvier (crax pauxi, Lin.), but the crax alector.

‡ Vol. i, p. 322, 354.

§ "During the eighteen years, which I passed in the missions of the Oroonoko, I saw only one *caparro*. *Gili*, vol. i, p. 240.

|| See above, Chap. xxi, p. 192.

river, and the form of which reminded us of the *Mausethurm* of the Rhine, opposite Bingen. Here, as on the banks of the Atabapo, we were struck by the sight of a small species of drosera, having altogether the appearance of the drosera of Europe.

The Oroonoko had sensibly swelled during the night; and the current, strongly accelerated, bore us in ten hours from the mouth of the Mataveni to the Upper Great Cataract, that of the Maypures, or Quittuna. The distance passed over was thirteen leagues. We recalled to mind with much satisfaction the scenes, where we had reposed in going up the river; we found again the Indians, who had accompanied us in our herbalizations; and we visited anew the fine spring *, that issues from a rock of stratified granite behind the house of the missionary: it's temperature was not changed more than 0·3°. From the mouth of the Atabapo as far as that of the Apure we travelled as through a country which we had long inhabited. We were reduced to the same abstinence; we were stung by the same moschettoes; but the certainty of reaching in a few weeks the term of our physical sufferings kept up our spirits.

The passage of the canoe through the Great Cataract obliged us to stop two days at May-

* It was 27·8° cent. on the 19th of April; I found it on the 30th of May 27·5°.

pures. Father Bernardo Zea, missionary at the *Raudals,* who had accompanied us to the Rio Negro, though ill, would conduct us with his Indians as far as Atures. One of them, *Zerepe*, the interpreter, who had been so unmercifully beaten at the beach of Pararuma *, fixed our attention by an expression of deep sorrow. We learned, that he had just lost a girl to whom he was engaged, and he had lost her in consequence of false intelligence, which had been spread respecting the direction of our voyage. Born at Maypures, *Zerepe* had been brought up in the woods by his parents, who were of the tribe of the Macoes. He had brought with him to the mission a girl of twelve years of age, whom he intended to marry at our return from the Cataracts. The Indian girl was little pleased with the life of the missions, and she was told, that the whites would go to the country of the *Portugueze* (Brazil), and would take with them *Zerepe*. Disappointed in her hopes, she seized a boat, and, with another girl of her own age, crossed the Great Cataract, and fled *al monte*. The recital of this act of courage was the great news of the place. Tne affliction of *Zerepe* however was not of long duration; born among the Christians, having travelled as far as the foot of the Rio Negro, understanding Spanish and the language of the Macoes, he thought

* See above, chap. xix, p. 531, 532.

himself superior to the people of his tribe. How then could he fail to forget a girl born in the forest?

On the 31st of May we passed the rapids of Guahiboes and Garcita. The islands, which rise in the middle of the waters of the river, shone with the purest verdure. The rains of winter had unfolded the spathes of the *vadgiai* palm-tree, the leaves of which rise straight toward the sky*. The eye is never wearied of the view of those scenes, where the trees and rocks give the landscape that great and severe character, which is marked in the arts by the name of the *heroic landscape*. We landed before sunset on the eastern bank of the Oroonoko, at the *Puerto de la Expedicion*, in order to visit the cavern of Ataruipe, of which I have spoken above†, and which is the place of sepulchre of a whole nation destroyed. I shall attempt to describe this cavern, so celebrated among the natives.

We climbed with difficulty, and not without some danger, a steep rock of granite, entirely bare. It would have been almost impossible to fix the foot on it's smooth and sloping surface, if large crystals of feldspar, resisting decomposition, did not stand out from the rock, and fur-

* See above, chap. xx, p. 50.

† See above, chap. xx, p. 72; and chap. xxi, p. 119.

nish points of support. Scarcely had we attained the summit of the mountain, when we beheld with astonishment the singular aspect of the surrounding country. The foamy bed of the waters is filled with an Archipelago of islands covered with palm-trees. Toward the west, on the left bank of the Oroonoko, stretch the savannahs of the Meta and the Casanare. They resembled a sea of verdure, the misty horizon of which was illumined by the rays of the setting sun. It's orb, resembling a globe of fire, suspended over the plain; and the solitary Peak of Uniana, which appeared more lofty from being wrapped in vapours that softened it's outline; all contributed to augment the majesty of the scene. Near us the eye looked down into a deep valley, enclosed on every side. Birds of prey and goatsuckers winged their lonely flight in this inaccessible circus. We found a pleasure in following with the eye their fleeting shadows, as they glided slowly over the flanks of the rock.

A narrow ridge led us to a neighbouring mountain, the rounded summit of which supported immense blocks of granite. These masses are more than forty or fifty feet in diameter; and their form is so perfectly spherical, that, appearing to touch the soil only by a small number of points, it might be supposed, at the least shock of an earthquake they

would roll into the abyss. I do not remember to have seen any where else a similar phenomenon, amid the decompositions of granitic soils. If the balls rested on a rock of a different nature, as it happens in the blocks of Jura, we might suppose, that they had been rounded by the action of water, or thrown out by the force of an elastic fluid; but their position on the summit of a hill alike granitic makes it more probable, that they owe their origin to the progressive decomposition of the rock.

The most remote part of the valley is covered by a thick forest. In this shady and solitary spot, on the declivity of a steep mountain, the cavern of Ataruipe opens itself; it is less a cavern than a jutting rock, in which the waters have scooped a vast hollow, when, in the ancient revolutions of our planet, they attained that height*. We soon reckoned in this tomb of a whole extinct tribe near six hundred skeletons well preserved, and so regularly placed, that it would have been difficult to make an error in their number. Every skeleton reposes in a sort of basket, made of the petioles of the palm-tree.

* I saw no vein, no *four* filled with crystal. (See vol. iii, p. 138.) The decomposition of granitic rocks, and their separation into large masses, dispersed in the plains and valleys under the form of *blocks* and of *balls* with concentric layers, appear to favor the enlarging of these natural excavations, which resemble real caverns.

These baskets, which the natives call *mapires*, have the form of a square bag. Their size is proportioned to the age of the dead; there are some for infants cut off at the moment of their birth. We saw them from ten inches to three feet four inches long, the skeletons in them being bent together. They are all ranged near each other, and are so entire, that not a rib, or a phalanx is wanting. The bones have been prepared in three different manners, either whitened in the air and the sun; dyed red with onoto, a colouring matter extracted from the bixa orellana; or, like real mummies, varnished with odoriferous resins, and enveloped in leaves of the heliconia or of the plantain tree. The Indians related to us, that the fresh corpse is placed in damp ground, in order that the flesh may be consumed by degrees; some months after, it is taken out, and the flesh remaining on the bones is scraped off with sharp stones. Several hordes in Guyana still observe this custom. Earthen vases half-baked are found near the *mapires*, or baskets. They appear to contain the bones of the same family. The largest of these vases, or funeral urns, are three feet high, and five feet and a half long. Their colour is greenish gray; and their oval form is sufficiently pleasing to the eye. The handles are made in the shape of crocodiles, or serpents; the edge is bordered with meanders, labyrinths, and

real *grecques*, in straight lines variously combined. Such paintings are found in every zone, among nations the most remote from each other, either with respect to the spot which they occupy on the Globe, or to the degree of civilization which they have attained. The inhabitants of the little mission of Maypures still execute them on their commonest pottery*; they decorate the bucklers of the Otaheiteans, the fishing implements of the Eskimoes, the walls of the Mexican palace of Mitla†, and the vases of ancient Greece. Every where a rhythmic repetition of the same forms flatters the eye, as the cadenced repetition of sounds soothes the ear. Analogies founded on the internal nature of our feelings, on the natural dispositions of our intellect, are not calculated to throw light on the filiation and the ancient connections of nations.

We could not acquire any precise idea of the period, to which the origin of the *mapires* and the painted vases, contained in the ossuary cavern of Ataruipe, can be traced. The greater part seemed not to be more than a century old; but it may be supposed, that, sheltered from all humidity, under the influence of a uniform tem-

* See above, chap. xxi, p. 154.

† See my *Views of the Cordilleras, and Monuments of the Ancient Inhabitants of America*, Pl. 50. [Vol. ii, English edition, or xiv of the present work, p. 158, Pl. 19.]

perature, the preservation of these articles would be no less perfect, if it dated from a period far more remote. A tradition circulates among the Guahiboes, that the warlike Atures, pursued by the Caribbees, escaped to the rocks that rise in the middle of the Great Cataracts; and there that nation, heretofore so numerous, became gradually extinct, as well as it's language*. The last families of the Atures still existed in 1767, in the time of the missionary Gili. At the period of our voyage an old parrot was shown at Maypures, of which the inhabitants related, and the fact is worthy of observation, that, "they did not understand what it said, because it spoke the language of the Atures."

We opened, to the great concern of our guides, several *mapires*, in order to examine attentively the form of the skulls; they all displayed the characteristics of the American race, with the exception of two or three, which approached indubitably to the Caucasian. We have observed above†, that in the middle of the Cataracts, in the most inaccessible spots, cases are found strengthened with iron bands, and filled with European tools, vestiges of clothes, and glass trinkets. These articles, which have given rise to the most absurd reports of treasures hidden

* See above, chap. xx, p. 13; and chap. xxi, p. 144.

† See above, chap. xxi, p. 121.

by the Jesuits, probably belonged to Portugueze traders, who had penetrated into these savage countries. Now may we suppose, that the skulls of European race, which we saw mingled with the skeletons of the natives, and preserved with the same care, were the remains of some Portugueze travellers, who had died of sickness, or had been killed in battle? The aversion which the natives affect for whatever is not of their own race renders this hypothesis little probable. Perhaps fugitive mestizoes of the missions of the Meta and Apure may have come and settled near the Cataracts, marrying women of the tribe of the Atures. Such mixed marriages sometimes take place in this zone, though they are more rare than in Canada, and in the whole of North America, where hunters of European origin unite themselves with savages, assume their habits, and sometimes acquire great political influence.

We took several skulls, the skeleton of a child of six or seven years old, and two of full-grown men of the nation of the Atures, from the cavern of Ataruipe. All these bones, partly painted red, partly varnished with odoriferous resins, were placed in the baskets (*mapires* or *canastos*), which we have just described. They made almost the whole load of a mule; and as we knew the superstitious aversion of the Indians for dead bodies, when they have given them sepulture,

we had carefully enveloped the *canastos* in mats recently woven. Unfortunately for us, the penetration of the Indians, and the extreme quickness of their senses, rendered all our precautions useless. Wherever we stopped, in the missions of the Caribbees, amid the Llanos, between Angostura and Nueva Barcelona, the natives assembled round our mules to admire the monkeys which we had purchased at the Oroonoko. These good people had scarcely touched our baggage, when they announced the approaching death of the beast of burden, "that carried the dead." In vain we told them, that they were deceived in their conjectures; and that the baskets contained the bones of crocodiles and manatees: they persisted in repeating, that they smelt the resin, that surrounded the skeletons, and "that they were their *old relations*." We were obliged to make the monks interpose their authority, in order to conquer the aversion of the natives, and procure for us a change of mules.

One of the skulls, which we took from the cavern of Ataruipe, has appeared in the fine work published by my old master, Blumenbach, on the varieties of the human species. The skeletons of the Indians were lost on the coast of Africa, together with a considerable part of our collections, in a shipwreck, in which perished our friend and fellow-traveller, Fray Juan Gon-

zales *, a young monk of the order of Saint Francis.

We withdrew in silence from the cavern of Ataruipe. It was one of those calm and serene nights, which are so common in the torrid zone. The stars shone with a mild and planetary light. Their scintillation was scarcely sensible at the horizon †, which seemed illumined by the great nebulæ of the southern hemisphere. An innumerable multitude of insects spread a reddish light on the ground, loaded with plants, and resplendent with these living and moving fires, as if the stars of the firmament had sunk down on the savannah. On quitting the cavern, we stopped several times to admire the beauty of this singular scene. The odoriferous vanilla, and festoons of bignonia, decorated the entrance; and above, on the summit of the hill, the arrowy branches of the palm-trees waved murmuring in the air ‡.

We descended toward the river, to take the road to the mission, where we arrived late in the night. Our imagination was struck by all we had just seen. Occupied continually by the present, in a country where the traveller is tempted

* See vol. iii, chap. 11, p. 350.

† See chap. x and xiii, vol. iii, p. 314 and 538.

‡ See the third discourse delivered at one of the public sittings of the Academy of Berlin. (*Tableaux de la Nature, traduites de l'Allemand par M. Eyriès*, vol. ii, p. 231.)

to regard human society as a new institution, he is more powerfully interested by remembrances of times past. These remembrances were not indeed of a distant date; but in all that is monumental antiquity is a relative idea, and we easily confound what is ancient with what is obscure and problematic. The Egyptians considered the historical remembrances of the Greeks as very recent. If the Chinese, or, as they prefer calling themselves, the inhabitants of the *celestial empire*, could have communicated with the priests of Heliopolis, they would have smiled at those pretensions of the Egyptians to antiquity. Contrasts not less striking are found in the north of Europe and of Asia, in the New World, and in every region, where the human race has not preserved a long consciousness of itself. The migration of the Toltecks, the most ancient historical event on the table-land of Mexico, dates only in the sixth age of our æra. The introduction of a good system of intercalation, and the reform of the calendars, the indispensable basis of an accurate chronology, took place in the year 1091. These epochas, which to us appear so modern, fall on fabulous times, when we reflect on the history of our species between the banks of the Oroonoko and the Amazon. We there see symbolic figures sculptured on the rocks, but no tradition throws light upon their origin. In the hot part of

Guyana we can go back only to the period, when the Castillian and Portugueze *conquerors*, and more recently peaceful monks, penetrated amid so many barbarous nations.

It appears, that, to the north of the Cataracts, in the strait of Baraguan, there are caverns filled with bones, similar to those which I have just described *: but I was informed of this fact only after my return; our Indian pilots did not mention it, when we landed at the strait. These tombs no doubt have given rise to a fable of the Otomacs, according to which the granitic and solitary rocks of Baraguan, the forms of which are very singular, are regarded as the *grand-fathers*, the *ancient chiefs* of the tribe. The custom of separating the flesh from the bones, very anciently practised by the Massagetes, is still known among several hordes of the Orooonoko. It is even asserted, and with some probability, that the Guaraons plunge their dead bodies under water enveloped in nets; and, that the small *caribe* fishes†, the serra-salmes, of which we saw every where an innumerable quantity, devour in a few days the muscular flesh, and thus *prepare* the skeleton. It may be supposed, that this operation can be practised only in places where crocodiles are not common.

* Gumilla, vol. i, p. 127, *Gili*, vol. ii, p. 107.

† See vol. iv, p. 443.

Some tribes, for instance the Tamanacs, are accustomed to lay waste the fields of the deceased, and cut down the trees which he has planted. They say, "that the sight of objects, which belonged to their relations, makes them melancholy." They like better to efface than to preserve remembrances. These effects of Indian sensibility are very detrimental to agriculture, and the monks oppose with energy these superstitious practices, to which the natives converted to Christianity still adhere in the missions.

The tombs of the Indians of the Oroonoko have not been sufficiently examined, because they do not contain valuable articles like those of Peru; and even on the spot no faith is now lent to the chimerical ideas, which were heretofore formed of the wealth of the ancient inhabitants of Dorado. The thirst of gold every where precedes the desire of instruction, and a taste for researches into antiquity; in all the mountainous part of South America, from Merida and Santa Marta to the table-lands of Quito and Upper Peru, the labours of absolute mining have been undertaken to discover tombs, or, as the Creoles say, employing a word altered from the language of the Incas, *guacas*. When in Peru, at Mancichi, I went into the *guaca* of Toledo, from which masses of gold were extracted, of the value, in the sixteenth century*, of five

* I found this calculation on the *fifth* paid in 1576, and

millions of franks. No trace of the precious metals has been found in the caverns, which have served the natives of Guyana for ages as sepulchres. This circumstance proves, that, even at the period when the Caribbees, and other travelling nations, made incursions to the south-west, gold had flowed in very small quantities from the mountains of Peru toward the eastern plains.

Wherever the granitic rocks do not furnish any of those large cavities, that are owing to their decomposition, or an accumulation of their blocks, the Indians confide the dead to the earth itself. The hammock *(chinchorro)*, a kind of net in which the deceased had reposed during his life, serves him for a coffin. This net is fastened tight around the body, a hole is dug in the hut, and there the dead is laid. This is the most usual method, according to the report of the missionary Gili, and what I myself learned from Father Zea. I do not believe, that there exists one *tumulus* in Guyana, not even in the plains of the Cassiquiare and the Essequibo. Some however are to be met with in the savannahs of

1592, into the treasury (*Caxas reales*) of Truxillo. The registers have been preserved. In Persia, in Upper Asia, and in Egypt, where the tombs have been searched at very different periods, no such immense treasures, I believe, have ever been found.

Varinas*, as in Canada, to the west of the Alleghanies†. It seems remarkable enough, that, notwithstanding the extreme abundance of wood in those countries, the natives of the Oroonoko were as little accustomed as the ancient Scythians to burn the dead. They formed funeral piles for this purpose sometimes after a battle only, when the number of the dead was considerable. Thus, in 1748, the Parecas burned not only the bodies of their enemies, the Tamanacs, but also those of their own relations, who fell on the field of battle. The Indians of South America, like all nations that live in a state of nature, are strongly attached to the spots, where the bones of their fathers repose. This feeling, which a great writer has painted in a manner so affecting in the episode of *Atala*, is cherished in all it's primitive ardour by the Chinese. These people, among whom every thing is the produce of art, or rather of the most ancient civilization, do not change their dwelling without carrying along with them the bones of their ancestors.

* Near Mijagual. See vol. iv, p. 314.

† This kind of mummies and skeletons contained in baskets were recently discovered in a cavern in the United States. It is believed, they belong to a race of men analogous to that of the Sandwich Islands. The description of these tombs (*Mitchell*, in the *Bibl. Univ.*, *Août*, 1817, p. 335) has however some similitude with that of the tombs of Ataruipe.

Coffins are seen deposited on the banks of great rivers, in order to be transported, with the furniture of the family, to a remote province. These removals of bones, heretofore more common * among the savages of North America, is not practised among the tribes of Guyana; but these are not nomades, like nations that live exclusively by hunting.

We staid at the mission of Atures only the time necessary for passing the canoe through the Great Cataract. The bottom of our frail bark was become so thin, that it required great care, to prevent it from splitting. We took leave of the missionary, Bernardo Zea, who remained at Atures, after having accompanied us during two months, and shared all our sufferings. This poor monk continued to have the same fits of a tertian ague; but to him they had become an habitual evil, to which he paid little attention. Other fevers of a more detructive kind prevailed at Atures, at our second visit. The greater part of the Indians could not leave their hammocks, and we were obliged to send in search of *cassava* bread, the most indispensable food of the country, to the independant but neighbouring tribe of the Piraoas. We had hitherto escaped

* The missionaries of the United States complain of the noisome smell, that is diffused by the Nanticokes, when travelling with the bones of their ancestors. *Histoir. trans.*, 1819, vol. i, p. 75.

these malignant fevers, which, I believe, are not contagious.

We ventured to pass in our canoe through the latter half of the Raudal of Atures. We landed here and there, to climb upon the rocks, which like narrow dikes joined the islands to one another. Sometimes the waters precipitate themselves over the dikes, sometimes they fall within them with a hollow noise. A considerable portion of the Oroonoko was dry, because the river had found an issue by subterraneous caverns. In these solitary haunts the rock manakin with gilded plumage (pipra rupicola), one of the most beautiful birds of the tropics, builds it's nest. The *Raudálito* of Carucari is caused by an accumulation of enormous blocks of granite. These blocks, several of which are spheroids of five or six feet in diameter, are piled together in such a manner, as to form spacious caverns. We entered one of these caverns, to gather the confervas, that were spread over the clefts and humid sides of the rock. This spot displayed one of the most extraordinary scenes of nature, that we had contemplated on the banks of the Oroonoko. The river rolled it's waters turbulently over our heads*. It seemed as if it were the sea dashing against reefs of rocks; but at the entrance of the cavern we

* See above, chap. 20, p. 54.

could remain dry beneath a large sheet of water, that precipitated itself in an arch from above the barrier. In other cavities, deeper, but less spacious, the rock was pierced by the effect of successive filtrations. We saw columns of water, eight or nine inches broad, descend from the top of the vault, and find an issue by clefts, that seemed to communicate at great distances with each other.

The cascades of Europe, forming only one fall, or several falls close to each other, can never produce such variety in the shifting landscape. This variety is peculiar to *rapids*, to a succession of small cataracts several miles in length, to rivers that force their way across rocky dikes and accumulated blocks of granite. We enjoyed this extraordinary sight longer than we wished. Our boat was to coast the eastern bank of a narrow island, and to take us in again after a long circuit. We passed an hour and half in vain expectation of it. Night approached, and with it a tremendous storm. It rained with violence. We began to fear, that our frail bark had been wrecked against the rocks, and that the Indians, conformably to their habitual indifference for the evils of others, had returned tranquilly to the mission. We were only three persons: completely wet, and uneasy respecting the fate of our boat, it appeared far from agreeable to us, to pass, without sleep, a long night of the

torrid zone, amid the noise of the *Raudales*. M. Bonpland resolved to leave me in the island with don Nicolas Sotto*, and swim across the branches of the river, that are separated by the granitic dikes. He hoped to reach the forest, and seek assistance at Atures from Father Zea. We dissuaded him with difficulty from undertaking this hazardous enterprise. He knew little of the labyrinth of small channels, into which the Oroonoko is divided. Most of them have strong whirlpools, and what passed before our eyes, while we were deliberating on our situation, proved sufficiently, that the natives had deceived us respecting the absence of crocodiles in the cataracts. The little monkeys, which we had carried along with us for months, were deposited on the point of our island. Wet by the rains, and sensible of the least lowering of the temperature, these delicate animals sent forth plaintive cries, and attracted to the spot two crocodiles, the size and leaden colour of which denoted their great age. Their unexpected appearance made us reflect on the danger we had run in bathing, at our first passing by the mission of Atures, in the middle of the *Raudal*. After long waiting, the Indians at length arrived at the close of day. The natural coffer-dam, by which they had endeavoured to

* See vol. iv, chap. 18, p. 416.

descend, in order to make the circuit of the island, had become impassable, on account of the little depth of the water. The pilot sought a long while for a more accessible passage in this labyrinth of rocks and islands. Happily our canoe was not damaged, and in less than half an hour our instruments, provision, and animals, were embarked.

We navigated part of the night, to pitch our tent again in the island of Panumana. We recognized with pleasure the spots, where we had herbalized when going up the Oroonoko. We examined once more on the beach of Guachaco that small formation of sand stone, which reposes directly on granite. It's position is the same as that of the sandstone, which my unfortunate countryman, Mr. Burckhardt, observed at the entrance of Nubia, superimposed on the granite of Syene. We passed, without visiting it, the new mission of San Borga, where (as we learned with much regret a few days after) the little colony of Guahiboes had fled *al monte*, from the chimerical fear, that we should carry them off, to sell them as *poitos*, or slaves *. After having passed the rapids of Tabaje, and the Raudal of Cariven, near the mouth of the great Rio Meta, we arrived without accident at Carichana. The missionary † received us with

* See vol. iv, chap. 19, p. 571.

† Fray Jose Antonio de Torre.

that kind hospitality, which we had already enjoyed on our first passage. The sky was little favourable for astronomical observations; we had obtained some new ones in the two Great Cataracts; but thence, as far as the mouth of the Apure, we were obliged to renounce the attempt. Mr. Bonpland had the satisfaction at Carichana of dissecting a manatee more than nine feet long. It was a female, the flesh of which appeared to us not unsavoury. I have spoken in another place of the manner of catching this herbivorous cetacea *. The Piraoas, some families of whom inhabit the mission of Carichana, detest this animal to such a degree, that they hid themselves, to avoid being obliged to touch it, when it was conveying to our hut. They said, "that the people of their tribe die infallibly, when they eat of it." This prejudice is the more singular, as the neighbours of the Piraoas, the Guamoes and the Otomacs, are very fond of the flesh of the manatee. We shall soon see, that the flesh of the crocodile is also an object of horror to some tribes, and of predilection to others.

The island of Cuba furnishes a fact little known in the history of the manatee. South of the port of Xagua, several miles from the coast, there are springs of fresh water in the middle of the sea. They are supposed to be owing to a

* See vol. iv, chap. 18, p. 447.

hydrostatic pressure exerted in subterraneous channels, that communicate with the lofty mountains of Trinidad. Small vessels sometimes take in water there; and, what is well worthy of observation, large manatees remain habitually in those spots. I have already called the attention of naturalists to the crocodiles that advance from the mouth of rivers far into the sea*. Analogous circumstances may have caused, in the ancient catastrophes of our planet, that singular mixture of pelagian and fluviatile bones and petrifactions, which is observed in some rocks of recent formation.

Our stay at Carichana was very useful in recruiting us from our fatigues. Mr. Bonpland bore with him the germe of a cruel malady; he stood in need of repose; but, as the *delta of the tributary streams*† included between the Horeda and Paruasi is covered with a rich vegetation, he made long herbalizations, and was wet through several times in a day. We found fortunately in the house of the missionary the most attentive care; bread was procured for us of the flour of maize, and even milk. The cows yield milk plentifully in the lower regions of the torrid zone, wherever good pasturage is found. I insist on this fact, because local circum-

* See vol. iii, chap. 11, p. 360.

† See above, chap. 23, p. 465, 466.

stances have spread through the Indian Archipelago the prejudice of considering hot climates as repugnant to the secretion of milk. We may conceive the indifference of the natives of the New World for a milk diet, the country having been originally destitute of animals capable of furnishing it*; but how can we avoid being astonished at this indifference in the immense Chinese population, living in great part without the tropics, and in the same latitude with the nomade and pastoral tribes of central Asia? If the Chinese have ever been a pastoral people, how have they lost the tastes and the habits so intimately connected with this state, which precedes agricultural institutions? These questions appear to me extremely interesting with respect both to the history of the nations of oriental Asia, and

* See chap. 17, vol. iv, p. 317: and chap. 22, p. 271 of the present volume. The rein-deer are not domesticated in Greenland as they are in Lapland; and the Eskimoes care little for their milk. The bisons taken very young accustom themselves, on the west of the Alleghanies, to graze with the herds of European cows. The females in some districts of India yield a little milk, but the savages have never thought of milking them. What is the origin of that fabulous story related by Gomara (chap. 43, p. 36), according to which the first Spanish navigators saw, on the coast of South Carolina, "stags led to the savannahs by herdsmen?" The females of the bison, according to Mr. Buchanan and the philosophical historian of the Indian Archipelago, Mr. Crawford, yield more milk than common cows.

to the ancient communications that are supposed to have existed between that part of the world and the north of Mexico.

We went down the Oroonoko in two days, from Carichana to the mission of Uruana, after having again passed the celebrated strait of Baraguan *. We stopped several times to determine the velocity of the river, and it's temperature at the surface, which was 27·4°. The velocity was found to be two feet in a second (sixty-two toises in 3′ 6″), in places where the bed of the Oroonoko was more than twelve thousand feet broad, and from ten to twelve fathoms deep. The slope of the river is in fact extremely gentle from the Great Cataracts to Angostura†; and, if a barometric measurement were wanting, the difference of height might be determined by approximation, by measuring from time to time the velocity of the stream, and the extent of the section in breadth and depth‡. We had some observations of the

* See vol. iv, chap. 19, p. 502.

† The descent of the Nile also, from Cairo to Rosetta, a distance of fifty-nine leagues (at 2273 t.), is only four inches in a league. *Descr. de l' Egypte Moderne*, vol. i, p. 58.

‡ Edinburgh Review, vol. xxiv, p. 414. According to Clark and Lewis, the velocity of the Missouri, near where it flows into the Mississipi, is seven feet in a second, and in some places more than twelve feet; which equals the velocity of the Cassiquiare. See above, p. 418.

stars at Uruana. I found the latitude of the mission to be 7° 8′; but the results from different stars left a doubt of more than 1′. The stratum of moschettoes, which hovered over the ground, was so thick, that I could not succeed in rectifying properly the artificial horizon. I tormented myself in vain; and regretted, that I was not provided with a mercurial horizon. On the 7th of June, good absolute altitudes of the Sun* gave me 69° 40′ for the longitude. We had advanced from Esmeralda 1° 17′ toward the west, and this chronometric determination merits entire confidence, on account of the double observations, made in going and returning, at the Great Cataracts, and at the confluence of the Atabapo and of the Apure.

The situation of the mission of Uruana is extremely picturesque. The little Indian village is placed at the foot of a lofty granitic mountain. Rocks every where appear in the form of pillars above the forest, rising higher than the tops of the tallest trees. The Oroonoko no where dis-

* The partial heights do not differ 2″. In these places, filled with venomous insects, observations are made most favourably by day. The meridian altitudes of the Sun may be taken by means of a reflecting instrument, in which the parallelism of the great and little mirror corresponds with a point of the limb twenty-five or thirty degrees beyond the commencement of the division. (*Obs. Astr.*, vol. i, p. xv, 222, 262, and 272).

plays a more majestic aspect, than when contemplated from the hut of the missionary, Fray Ramon Bueno. It is more than two thousand six hundred toises broad *, and runs without any winding, like a vast canal, straight toward the east. Two long and narrow islands (*Isla de Uruana* and *Isla vieja de la Manteca*) contribute to give extent to the bed of the river; the two banks are parallel, and we cannot call it divided into different branches. The mission is inhabited by the Otomacs †, a tribe in the rudest state, and presenting one of the most extraordinary physiological phenomena. The Otomacs eat earth; that is, they swallow every day, during several months, very considerable quantities, to appease hunger, without injuring their health. Since my return to Europe, this incontestable fact has become a subject of warm dispute, because two assertions have been confounded together, which are extremely different; that of *eating earth, and that of being nourished by it.* Though we could stay only one day at Uruana, this short space of time sufficed to instruct us in the preparation of the *poya* (or balls of earth). I also found some traces of this vitiated appetite among the Guamoes; and between the confluence of the Meta and the Apure,

* Base, 140 metres, angles 90° and 88° 27′ 40″. Breadth 5211 metres.

† *Otomacos* in Spanish, *Ottomacu* in Indian.

where every body speaks of *geophagy* as of a thing anciently known. I shall here confine myself to an account of what we ourselves saw, or heard from the missionary, whom an unhappy fatality had doomed to live for twelve years among the savage and turbulent tribe of the Otomacs.

The inhabitants of Uruana belong to those *nations of the savannahs (Indios andantes)*, who, more difficult to civilize than the *nations of the forest* (Indios del monte)*, have a decided aversion to cultivate the land, and live almost exclusively on hunting and fishing. They are men of a very robust constitution; but ugly, savage, vindictive, and passionately fond of fermented liquors. They are omnivorous *animals* in the highest degree; and therefore the other Indians, who consider them as barbarians, have a common saying, "nothing is so disgusting, that an Otomac will not eat it." While the waters of the Oroonoko and it's tributary streams are low, the Otomacs subsist on fish and turtles. The former they kill with surprising dexterity, by shooting them with an arrow, when they appear at the surface of the water. When the rivers swell, which in South America, as well as in Egypt and in Nubia, is erroneously attributed to the melting of the snows, and which occurs

* On the difference between them, see above, p. 271.

periodically in every part of the torrid zone, fishing almost entirely ceases. It is then as difficult to procure fish in the rivers which are become deeper, as when you are sailing on the open sea. It often fails the poor missionaries, on fast days as well as flesh-days, though all the young Indians are under the obligation of "fishing for the convent." At the period of these inundations, which last two or three months, the Otomacs swallow a prodigious quantity of earth. We found heaps of balls in their huts, piled up in pyramids three or four feet high. These balls were five or six inches in diameter. The earth, which the Otomacs eat, is a very fine and unctuous clay, of a yellowish gray colour; and, being slightly baked in the fire, the hardened crust has a tint inclining to red, owing to the oxid of iron which is mingled with it. We brought away some of this earth, which we took from the winter provision of the Indians; and it is absolutely false, that it is steatitic, and contains magnesia. Mr. Vauquelin did not discover any traces of this earth in it: but he found, that it contained more silex than alumin, and three or four per cent of lime.

The Otomacs do not eat every kind of clay indifferently; they choose the alluvial beds or strata that contain the most unctuous earth, and the smoothest to the feel. I inquired of the missionary, whether the moistened clay were

made to undergo, as Father Gumilla asserts, that peculiar decomposition, which is indicated by a disengagement of carbonic acid and sulphuretted hydrogen, and which is designated in every language by the term of *putrefaction* *; but he assured us, that the natives neither cause the *clay* to *rot*, nor do they mingle it with flour of maize, oil of turtles' eggs, or fat of the crocodile. We ourselves examined, both at the Oroonoko and after our return to Paris, the balls of earth, which we brought away with us, and found no trace of the mixture of any organic substance, whether oily or farinaceous. The savage regards every thing as nourishing, that appeases hunger: when therefore you inquire of an Otomac, on what he subsists during the two months when the river is the highest, he shows you his balls of clayey earth. This he calls his principal food; for at this period he can seldom procure a lizard, a root of fern, or a dead fish swimming at the surface of the water. If the Indian eat earth from want during two months (and from three quarters to five quarters of a pound in twenty-four hours), he does not the less regale himself with it during the rest of the year. Every day in the season of drought, when

* Tienen hoyos en la qual hai greda fina, bien amasada, *podrida* a fuerza de continua agua, como la preparan los alfareros para hacer loza fina. *Gumilla*, tom. i, p. 200.

fishing is most abundant, he scrapes his balls of *poya*, and mingles a little clay with his other aliment. What is most surprising is, that the Otomacs do not become lean by swallowing such quantities of earth: they are, on the contrary, extremely robust, and far from having the belly tense and puffed up. The missionary Fray Ramon Bueno asserts, that he never remarked any alteration in the health of the natives at the period of the great risings of the Oroonoko.

The following are the facts in all their simplicity, which we were able to verify. The Otomacs during some months eat daily three quarters of a pound of clay slightly hardened by fire, without their health being sensibly affected by it. They moisten the earth afresh, when they are going to swallow it. It has not been possible to verify hitherto with precision how much nutritious vegetable or animal matter the Indians take in a week at the same time; but it is certain, that they attribute the sensation of satiety, which they feel, to the clay, and not to the wretched aliments which they take with it occasionally. No physiological phenomenon being entirely insulated, it may be interesting to examine several analogous phenomena, which I have been able to collect.

I observed every where within the torrid zone, in a great number of individuals, children, women, and sometimes even full-grown men, an

inordinate and almost irresistible desire of swallowing earth; not an alkaline or calcareous earth, to neutralize (as it is vulgarly said) acid juices, but a fat clay, unctuous, and exhaling a strong smell. It is often found necessary to tie the children's hands, or to confine them, to prevent their eating earth, when the rain ceases to fall. At the village of Banco, on the bank of the river Magdalena, I saw the Indian women who make pottery continually swallowing great pieces of clay. These women were not in a state of pregnancy; and they affirmed, that "earth is an aliment, which they do not find hurtful." In other American tribes people soon fall sick, and waste away, when they yield too much to this mania of eating earth. We found at the mission of San Borja an Indian child of the Guahiba nation, who was as thin as a skeleton. The mother informed us by an interpreter, that the little girl was reduced to this lamentable state of atrophy in consequence of a disordered appetite, having refused during four months to take almost any other food than clay. Yet San Borja is only twenty-five leagues distant from the mission of Uruana, inhabited by that tribe of the Otomacs, who, from the effect no doubt of a habit progressively acquired, swallow the poya without experiencing any pernicious effects. Father Gumilla asserts, that the Otomacs purge themselves with oil, or rather with the melted fat of

the crocodile, when they feel any gastric obstructions; but the missionary whom we found among them was little disposed to confirm this assertion. It may be asked, why the mania of eating earth is much more rare in the frigid and temperate zones, than in the torrid; and why in Europe it is found only among women in a state of pregnancy, and sickly children. This difference between hot and temperate climates arises perhaps only from the inert state of the functions of the stomach, caused by strong cutaneous perspiration. It has been supposed to be observed, that the inordinate taste for eating earth augments among the African slaves, and becomes more pernicious, when they are restricted to a regimen purely vegetable, and deprived of spirituous liquors*. If the latter render the practice of eating earth less injurious, we may almost felicitate the Otomacs on their decided taste for intoxication.

The Negroes on the coast of Guinea delight in eating a yellowish earth, which they call *caouac*. The slaves who are taken to America try to procure for themselves the same enjoyment; but it is constantly detrimental to their health. They say, "that the earth of the West Indies is not so easy of digestion as that of their country." Thibaut de Chanvalon, in his Voy-

* Moreau de Jonnès Obs. on the Dirt-eaters in the West Indies (*Bullet. de la Soc. Méd., Mai*, 1816).

age to Martinico, expresses himself very judiciously on this pathological phenomenon. " Another cause," he says, " of this pain in the stomach is, that several of the Negroes, who come from the coast of Guinea, eat earth ; not from a depraved taste, or in consequence of a disease, but from a habit contracted at home in Africa, where they eat, they say, a particular earth, the taste of which they find agreeable, *without suffering any inconvenience.* They seek in our islands for the earth the most similar to this, and prefer a yellowish red volcanic tufa. It is sold secretly in our public markets ; but this is an abuse, which the police ought to correct. The Negroes who have this habit are so fond of *caouac,* that no chastisement will prevent their eating it*."

In the Indian Archipelago, at the island of Java, Mr. Labillardière saw, between Surabaya and Samarang, little square and reddish cakes exposed to sale. These cakes, called *tanaampo,* were cakes of clay, slightly baked, which the natives eat with appetite†. The attention of physiologists, since my return from the Oroonoko, having been powerfully fixed on these phenomena of *geophagy,* Mr. Leschenault (one of the naturalists of the expedition to the Southern Lands under the command of Captain Bau-

* *Voyage à la Martinique,* 1763, p. 84.

† Voyage in Search of La Perouse, vol. ii, p. 322.

din) has published some curious details on the *tanaampo*, or *ampo*, of the Javanese. "The reddish and somewhat ferruginous clay," he says*, "which the inhabitants of Java are fond of eating occasionally, is spread on a plate of iron, and baked, after having been rolled into little cylinders in the form of the bark of cinnamon. In this state it takes the name of *ampo*, and is sold in the public markets. This clay has a peculiar taste, which is owing to the torrefaction; it is very absorbent, and adheres to the tongue, which it dries. In general it is only the Javanese women who eat the *ampo*, either in the time of their pregnancy, or in order to grow thin; the want of plumpness being a kind of beauty in this country. The use of this earth is fatal to health; the women lose their appetite imperceptibly, and no longer take without disgust a very small quantity of food; but the desire of becoming lean, and of preserving a slender shape, can brave these dangers, and maintains the credit of the *ampo*." The savage inhabitants of New Caledonia also, to appease their hunger in times of scarcity, eat great pieces of a friable *lapis ollaris*†. Mr. Vauquelin analysed this stone, and found in it,

* Letter from Mr. Leschenault to Mr. de Humboldt on the Kind of Earth which is eaten at Java. (See *Tableaux de la Nature*, vol. i, p. 209.)

† *Labillardière*, vol. ii, p. 205.

beside magnesia and silex in equal portions, a small quantity of oxid of copper. Mr Goldberry had seen the Negroes in Africa, in the islands of Bunck and Los Idolos, eat an earth of which he had himself eaten, without being incommoded by it, and which also was a white and friable steatite*. In looking over these examples, which are all taken from the torrid zone, we are struck by the idea of finding a taste, which nature it would seem should have reserved for the inhabitants of the most steril regions, prevail among races of rude and indolent men, who live in the finest and most fertile countries on the globe. We saw at Popayan, and in several mountainous parts of Peru, lime reduced to a very fine powder, sold in the public markets to the natives among other articles of provision. This powder, when used, is mingled with *coca*, that is, with the leaves of the erythroxylon peruvianum. It is well known, that Indian messengers take no other aliment for whole days than lime and *coca*; both excite the secretion of spittle, and of the gastric juice; they take away the appetite, without giving any nourishment to the body. In other parts of South America, on the coast of Rio de la Hacha, the Guajiroes swallow lime alone, without adding any vegetable matter to it. They always carry with them

* Goldberry, *Voyage en Afrique*, vol ii, p. 455.

a little box filled with lime, as we do snuff-boxes, and as in Asia people carry a betel box. This American custom excited the curiosity of the first Spanish navigators*. Lime blackens the teeth; and in the Indian Archipelago, as among several American hordes, to blacken the teeth is to beautify them. In the cold regions of the kingdom of Quito, the natives of Tigua eat habitually from choice, and without being incommoded by it, a very fine clay, mixed with quartzose sand. This clay, suspended in water, renders it milky. We find in their huts large vessels filled with this water, which serves as a beverage, and which the Indians call *agua* or *leche de llanka*†.

When we reflect on the whole of these facts, we perceive, that this disorderly appetite for clayey, magnesian, and calcareous earth, is most common among the people of the torrid zone; that it is not always a cause of disease; and that some tribes eat earth from choice, while others (the Otomacs in America, and the inhabitants of New Caledonia, in the Pacific Ocean,) eat it from want, and to appease hunger. A great number of physiological phenomena prove, that a temporary cessation of hunger may be produced, without the substances that are sub-

* *Grynæi Orb. Nov.*, p. 223.

† Milk of clay. *Llanka* is a word of the general language of the Incas, signifying fine clay.

mitted to the organs of digestion being, properly speaking, nutritive. The earth of the Otomacs, composed of alumen and silex, furnishes probably nothing, or almost nothing, to the composition of the organs of man. These organs contain lime and magnesia in the bones, in the lymph of the thoracic duct, in the colouring matter of the blood, and in white hairs; they afford very small quantities of silex in black hair; and, according to Mr. Vauquelin, but a few atoms of alumin in the bones, though this is contained abundantly in the greater part of those vegetable matters, which form part of our nourishment. It is not the same with man as with animated beings placed lower in the scale of organization. In the former, assimilation is exerted only on those substances, that enter essentially into the composition of the bones, the muscles, and the medullary matter of the nerves and the brain. Plants, on the contrary, draw from the soil the salts that are found accidentally mixed in it; and their fibrous texture varies according to the nature of the earths, that predominate in the spots which they inhabit. An object well worthy of research, and which has long fixed my attention*, is the small number of simple substances (earthy and metallic),

* *Aphor. ex Physiologia chimica Plantarum*, in my *Flora Freib. subterranea*, p. 42.

that enter into the composition of animated beings, and which alone appear fitted to maintain what we may call the chemical movement of vitality.

We must not confound the sensations of hunger with that vague feeling of debility, which is produced by want of nutrition, and by other pathologic causes. The sensation of hunger ceases long before digestion takes place, or the chyme is converted into chyle. It ceases either by a nervous and tonic impression exerted by the aliments on the coats of the stomach; or because the digestive apparatus is filled with substances, that excite the mucous membranes to an abundant secretion of the gastric juice. To this tonic impression on the nerves of the stomach the prompt and salutary effects of what are called nutritive medicaments may be attributed, such as chocolate*, and every substance that gently stimulates and nourishes at the same time. It is the absence of a nervous stimulant, that renders the solitary use of a nutritive substance (of starch, gum, or sugar,) less favourable to assimilation, and to the reparation of the losses, which the human body undergoes. Opium, which is not nutritive, is employed with

* *Polit. Essay on New Spain*, vol. ii, p. 365. Meat roasted, or much broiled, is more stimulating than boiled meat. The manner of preparing food changes it's chemical proportions.

success in Asia, in times of great scarcity: it acts as a tonic. But when the matter, which fills the stomach, can be regarded neither as an aliment, that is, as proper to be assimilated, nor as a tonic stimulating the nerves, the cessation of hunger is probably owing only to the secretion of the gastric juice. We here touch upon a problem of physiology, which has not been sufficiently investigated. Hunger is appeased, the painful feeling of inanition ceases, when the stomach is filled. It is said, that this viscus stands in need of *ballast;* and every language furnishes figurative expressions, which convey the idea, that a mechanical distention of the stomach causes an agreeable sensation. Very recent works of physiology still speak of the painful contraction, which the stomach experiences during hunger, the friction of it's sides against one another, and the action of the acid gastric juice on the texture of the digestive apparatus. The observations of Bichat, and more particularly the fine experiments of Mr. Magendie, are in contradiction to these superannuated hypotheses. After twenty-four, forty-eight, or even sixty hours of abstinence, no contraction of the stomach is observed; it is only on the fourth or fifth day, that this organ appears to change in a small degree it's dimensions. The quantity of the gastric juice diminishes with the duration of abstinence. It is probable, that this

juice, far from accumulating, is digested as an alimentary substance. If a cat or dog be made to swallow a substance, which is not susceptible of being digested, a pebble for instance, a mucous and acid liquid is formed abundantly in the cavity of the stomach, somewhat resembling by it's composition the gastric juice of the human body*. It appears to me very probable, according to the analogy of these facts, that, when the want of aliments compels the Otomacs and the inhabitants of New Caledonia to swallow clay and steatite during a part of the year, these earths occasion a powerful secretion of the gastric and pancreatic juices in the digesting apparatus of these people. The observations, which I made on the banks of the Oroonoko, have been recently confirmed by the direct experiments of two distinguished young physiologists, Messrs. Hippolyte Cloquet, and Breschet. After long fasting, they ate as much as five ounces of a silvery green and very flexible laminar talc. Their hunger was completely satisfied, and they felt no inconvenience from a kind of food, to which their organs were unaccustomed. It is known, that great use is still made in the East of the bolar and sigillated earths of Lemnos, which are clay mingled with oxid of iron. In Germany, the workmen em-

* Magendie, *Prècis Elément. de Physiologie*, vol. i, p. 13 and 25.

ployed in the quarries of sandstone worked at the mountain of Kiffhæuser spread a very fine clay upon their bread, instead of butter, which they call *steinbutter**, stone butter; and they find it singularly filling, and easy of digestion†.

When in consequence of the changes, that are now preparing in the system of the Spanish colonies, the missions of the Oroonoko shall become more frequented by enlightened travellers, the number of days will be determined with precision, during which the Otomacs can subsist without adding to the clay they swallow any other aliment from the vegetable or animal kingdom. A considerable portion of gastric and pancreatic juice must be employed, to digest, or rather to envelope and expel with the fecal matter, so great a quantity of clay. We may conceive, that the secretion of these juices fit to enter into the mass of the chyle is augmented by the presence of earths in the stomach and intestines; but how does it happen, that such abundant secretions, which, far from furnishing the body with new matter, only produce the removal of substances already acquired by other means, do not cause at length a feeling of

* This *steinbutter* must not be confounded with the *mountain butter*, *bergbutter*, which is a saline substance, owing to a decomposition of aluminous schists.

† *Freiesleben*, *Kupferschiefer*, vol. iv, p. 118. *Kesler*, in *Gilbert's Annalen*, B. 28, p. 492.

exhaustion? The state of perfect health enjoyed by the Otomacs during the time when they use little muscular exercise, and are subjected to so extraordinary a regimen, is a phenomenon difficult to be explained. It can be attributed only to a habit, prolonged from generation to generation. The structure of the digestive apparatus differs much in animals, that feed exclusively on flesh or on seeds; it is even probable, that the gastric juice changes it's nature, according as it is employed in effecting the digestion of animal or vegetable substances; yet we are able gradually to change the regimen of herbivorous and carnivorous animals, to feed the former with flesh, and the latter with vegetables. Man can accustom himself to an extraordinary abstinence, and find it but little painful, if he employ tonic or stimulating substances (various drugs, small quantities of opium, betel, tobacco, leaves of coca); or if he supply his stomach from time to time with earthy, insipid substances, that are not in themselves fit for nutrition. Like man in a savage state, some animals also, when pressed by hunger in winter, swallow clay or friable steatites; such are the wolves in the north-east of Europe, the reindeer, and, according to the testimony of Mr. Patrin, the kids in Siberia. The Russian hunters on the banks of the Jenisey and the Amour use a clayey matter, which they call *rock butter*,

as a bait. The animals scent this clay from afar; and are fond of the smell, as the *clays of bucaros*, known in Portugal and Spain by the name of odoriferous earths (*tierras olorosas*), have an odour agreeable to women*. Brown relates, in his History of Jamaica, that the crocodiles of South America swallow small stones, and pieces of very hard wood, when the lakes which they inhabit are dry, or when they are in want of food. Mr. Bonpland and I observed in a crocodile, eleven feet long, which we dissected at Batalley, on the banks of the Rio Magdalena, that the stomach of this reptile contained fish half digested, and rounded fragments of granite three or four inches in diameter. It is difficult to admit, that the crocodiles swallow these stony masses accidentally, for they do not catch fish with their lower jaw resting on the ground at the bottom of the river. The Indians have framed the absurd hypothesis, that these indolent animals like to augment their weight, that they may have less trouble in diving. I rather think, that they load their stomach with large pebbles, to excite an abundant secretion of gastric juice. The experiments of Mr. Magendie

* Bucaro, *vas fictile odoriferum*. People are fond of drinking out of these vessels on account of the smell of the clay. The women of the province of Alentejo acquire a habit of chewing the bucaro earth; and feel a great privation, when they cannot indulge this vitiated taste.

render this explanation extremely probable. With respect to the habit of the granivorous birds, particularly the gallinaceæ and ostriches, of swallowing sand and small pebbles, it has been hitherto attributed to an instinctive desire of accelerating the trituration of the aliments in a muscular and thick stomach.

We have seen above, that tribes of Negroes on the Gambia mingle clay with their rice; some families of Otomacs had perhaps formerly the custom of causing maize and other farinaceous seeds to *rot* in their *poya*, in order to eat earth and amylaceous matter together: perhaps it was a preparation of this kind, that father Gumilla described confusedly in the first volume of his work, when he affirms, "that the Guamoes and the Otomacs feed upon earth only because it is impregnated with the *sustancia del maiz*, and the fat of the cayman." I have already observed above, that neither the present missionary of Uruana, nor Fray Juan Gonzales, who lived long in those countries, knew any thing of this mixture of animal and vegetable substances with the *poya*. Perhaps father Gumilla has confounded the preparation of the earth, which the natives swallow, with the custom they still retain (of which Mr. Bonpland acquired the certainty on the spot) of burying in the ground the beans of a species of mimosaceæ*, to cause them

* Of the group of *ingas*.

to enter into decomposition, in order to reduce them into a white bread, savoury, but difficult of digestion. I repeat, that the balls of *poya*, which we drew from the winter stores of the Indians, contained no trace of animal fat, or of amylaceous matter. Gumilla being one of the most credulous travellers we know, it almost perplexes us to credit facts, which he has thought fit to reject. Fortunately, in the second volume of his work, he resumes a great part of what he advanced in the first; he no longer doubts, that "half at least *(a lo menos)* of the bread of the Otomacs and the Guamoes is clay." He asserts, "that children and full grown persons not only eat this bread without suffering in their health, but also great pieces of pure clay (*muchos terrones de pura greda.*)" He adds, that those who feel a weight on the stomach purge themselves with the fat of the crocodile, which restores their appetite, and enables them to continue to eat pure earth*. I doubt the *manteca de caiman* being a purgative; but, as it is very fluid, it may contribute to envelop the earth, which has not been expelled among the fecal matter. It is certain, that the Guamoes are very fond, if not of the fat, at least of the flesh of the crocodile, which appeared to us white, and without any smell of musk. In

* Gumilla, vol. ii, p. 260.

Sennaar, according to Mr. Burckhardt, it is alike much esteemed, and sold in the markets.

I cannot silently pass over some questions, that have been agitated in different memoirs published on occasion of my voyage on the Oroonoko. Mr. Leschenault inquires, whether the *ampo* (the clay of Java) may not be useful in appeasing hunger occasionally, in circumstances when a person is destitute of food, or compelled to have recourse to substances unwholesome or hurtful, though derived from the organic kingdoms. I believe, that in experiments tried on the consequences of long abstinence, an animal forced to swallow clay (in the manner of the Otomacs) would suffer less than another animal, the stomach of which had received no aliment. An Italian physiologist *, struck with the small quantities of the phosphats of lime and magnesia, of silex, sulphur, soda, fluor, iron, and manganese; and the large quantities of carbon, oxygen, azot, and hydrogen, which are contained in the solid and liquid parts of the human body; inquires whether respiration may not be regarded as a *continued act* of nutrition, while the digestive apparatus is filled with clay. The chemical analysis of the air inhaled and the air expired does not favour this hypothesis. It

* Physico-chemical Researches, vol. ii, p. 291, 294.

is difficult to ascertain the loss of a very small quantity of azot, and it may be admitted, that in general the functions of respiration are confined to the removal of carbon and hydrogen from the body.

A moistened mixture of phosphat and carbonat of lime, cannot be nourishing like substances equally destitute of azot, (such as sugar, gum, starch,) but drawn from the organic kingdom. Our digestive apparatus is like a galvanic pile, which decomposes only certain substances. The assimilation ceases, not solely because the matter, which the stomach receives, does not contain aliments similar to those, which compose the human body; but also because the digestive power, that of chemical decomposition, does not extend indifferently to all combinations. We can scarcely dwell on these speculations of general physiology, without inquiring what would have been the state of society, or rather of the human race, if man had no need of the productions of organization and vitality as aliment. No habit can essentially change the mode of nutrition. We shall never learn to digest and assimilate earth: but since the grand experiments of Gay-Lussac and Thenard have made known to us, that only slight differences in the proportions of oxygen, hydrogen, and carbon, distinguish the hardest wood from the substance

of starch *, how can we deny, that chemistry may one day succeed in converting those enormous vegetable masses, those textures of hardened fibres, that compose the trunks of the trees of our forests, into alimentary substances? Such a discovery, to be important, must be founded on cheap and simple processes: but in this supposition, which appears scarcely probable, it would change the organization of political bodies, the price of labour, and the actual distribution of the population of the Globe. In rendering man more independant, it would tend to dissolve the bonds of society, and to sap the foundations of industry and civilization.

The little village of Uruana is more difficult to govern, than the greater part of the other missions. The Otomacs are a restless, turbulent people, with unbridled passions. They are not only fond to excess of the fermented liquors from

* Starch.	Oak timber.
Oxygen.....49·68	41·78
Carbon.....43·55	52·53
Hydrogen..... 6·77	5·69
100·00	100·00

The unwholesome bread of the Laplanders, called birch-bread and pine bread, is made from the alburnum of trees; but they have lately succeeded in making cakes somewhat nutritive, with a mixture of wheaten flour and rasped wood of the oak.

cassava and maize, and of palm wine, but they throw themselves into a peculiar state of intoxication, we might almost say of madness, by the use of the powder of *niopo* *. They gather the long pods of a mimosacea, which we have made known by the name of *acacia niopo* †, cut them into pieces, moisten them, and cause them to ferment. When the softened seeds begin to grow black, they are kneaded like a paste, mixed with some flour of cassava and lime procured from the shell of a helix, and the whole mass is exposed to a very brisk fire, on a grate of hard wood. The hardened paste takes the form of small cakes. When it is to be used, it is reduced to a fine powder, and placed on a dish five or six inches wide. The Otomac holds this dish, which has a handle, in his right hand, while he inhales the *niopo* by the nose, through a forked bone of a bird, the two extremities of which are applied to the nostrils. This bone, without

* In Maypure, *nupa*; the missionaries say *ñopo*.

† It is an acacia with very delicate leaves, and not an inga, as Mr. *Willdenow* has said by mistake. (*Spec. Plant.*; vol. iv, pl. 2, p. 1027.) We brought home another species of mimosacea (the *chiga* of the Otomacs, and the *sepa* of the Maypures), that yields seeds, the flour of which is eaten at Uruana like cassava. From this flour the *chiga bread* is prepared, which is so common at Cunariche, and on the banks of the Lower Oroonoko. The chiga is a species of *inga*, and I know of no other mimosacea, that can supply the place of the cerealia.

which the Otomac believes that he could not take this kind of snuff, is seven inches long: it appeared to me to be the leg bone of a large sort of plover (*échassier*). I sent the *niopo*, and all this singular apparatus, to Mr. de Fourcroy at Paris. The *niopo* is so stimulating, that the smallest portions of it produce a violent sneezing in those, who are not accustomed to it's use. Father Gumilla says*, "This diabolical powder of the Otomacs, furnished by an arborescent tobacco-plant, intoxicates them by the nostrils (*emboracha por las narices*), deprives them of reason for some hours, and renders them furious in battle." However varied may be the family of the leguminous plants in the chemical and medical properties of their seeds, juices, and roots, we cannot believe, from what we know hitherto of the group of mimosaceæ, that it is principally the pod of the *acacia niopo*, that imparts the stimulant power to the snuff of the Otomacs. This power is owing, no doubt, to the lime freshly calcined. We have shown above, that the mountaineers of the Andes of Popayan, and the Guajiroes who wander between the lake of Maracaybo and the Rio la Hacha, are also fond of swallowing lime as a stimulant, to augment the secretion of the spittle and the gastric juice.

* *Orinóco illust.*, vol. i, p. 202.

In sending to Europe the complicated apparatus, which the Otomacs employ in order to inhale the powder of *niopo*, I directed the attention of the learned to an analogous custom, which Mr. de la Condamine observed among the natives of the Upper Maragnon. The Omaguas, whose name is rendered celebrated by the expeditions attempted in search of Dorado, have the same dish, and the same hollow bone of a bird, by which they convey to their nostrils their powder of *curupa*. The seed that yields this powder is no doubt also a mimosacea; for the Otomacs, according to Father Gili, denote even now, at the distance of one hundred and sixty leagues from the Amazon, the *acacia niopo* by the name of *curupa**. Since the geographical researches, which I have recently made on the theatre of the exploits of Philip von Huten, and on the real situation of the province of Papamene †, or of the Omaguas, the probability of an ancient communication between the Otomacs of the Oroonoko and the Omaguas of the Maragnon has become more interesting and more probable. The former came from the Meta, perhaps from the country between the Meta and the Guaviare; the latter assert, that they descended

* *Gili*, vol. i, p. 201. *La Condamine, Voyage à l'Amazone*, p. 62.

† See above, p. 319, 323, 340.

in great numbers * to the Maragnon by the Rio Japura, coming from the eastern declivity of the Andes of New Grenada. Now, it is precisely between the Guayavero, which joins the Guaviare, and the Caqueta, which takes lower down the name of Japura, that the country of the Omagua appears to be situate, of which the adventurers of Coro and Tocuyo in vain attempted the conquest. There is no doubt a striking contrast between the present barbarism of the Otomacs, and the ancient civilization of the Omaguas; but all parts of the latter nation were not perhaps alike advanced in civilization, and the example of tribes fallen into complete barbarism are unhappily but too common in the history of our species. Another point of resemblance may be remarked between the Otomacs and the Omaguas. Both of these nations are celebrated among all the tribes of the Oroonoko and the Amazon for the frequent use which they make of *caoutchouc*, or the inspissated milk of the euphorbiaceæ and the urticeæ.

* I do not admit, with Mr. de la Condamine, that the whole nation of the Omaguas came from the north. (See the learned researches of Mr. Vater on the ancient seats of that powerful people, tolerably advanced in civilization, in *Mithridates*, vol. iii, pl. 1, p. 598.) The Om-aguas or En-aguas called themselves also Aguas (*Acunha*, p. 24). For this reason, no doubt, the province of Papamene, or of the Omaguas, bore the name of *Dit-Agua*. (Fray Pedro Simon, p. 340.)

The real herbaceous tobacco* (for the missionaries have the habit of calling the *niopo* or *curupa* tree-tobacco) has been cultivated from time immemorial by all the native people of the Oroonoko; and at the period of the *conquest*, the habit of smoking was found to be alike spread over both Americas. The Tamanacs and the Maypures of Guyana wrap maize leaves round their cigars, as the Mexicans did at the arrival of Cortes. The Spaniards have substituted paper for the leaves of maize, in imitation of them. The poor Indians of the forests of the Oroonoko know as well as did the great nobles at the court of Montezuma, that the smoke of tobacco is an

* The word tobacco (*tabacco*), like the words savannah, maize, cacique, maguey (agave), and manatee, belongs to the ancient language of Haiti, or Saint Domingo. It did not properly denote the herb, but the tube, the instrument through which the smoke was inhaled. It seems surprising, that a vegetable production so universally spread should have different names among neighbouring people. The *pete-ma* of the Omaguas is, no doubt, the *pety* of the Guaranies; but the analogy between the Cabre and Algonkin, or Lenni-Lenape, words, which denote tobacco, may be merely accidental. The following are the synonimes in thirteen languages.

North-America. Azteck, or Mexican; *yetl:* Algonkin; *sema:* Huron; *oyngoua.*

South-America. Peruvian or qquichua; *sayri:* Chiquito; *pâis*: Guarany; *pety:* Vilela; *tusup:* Mbaja, west of the Paraguay, *nalodagadi:* Moxo between the Rio Ucayale and the Rio Madeira; *sabare:* Omagua; *petema:* Tamanac; *cavai:* Maypure; *jema:* Cabre; *scema.*

excellent narcotic; and they use it not only in order to procure their afternoon nap, but also to put themselves into that state of quietism, which they call with great simplicity *dreaming with the eyes open*, or a *day dream*. The use of tobacco appeared to me to be now very rare in the missions; and in New Spain, to the great regret of the revenue officers, the natives, who almost all descend from the lowest class of the Azteck people *, do not smoke at all. Father Gili † affirms, that the practice of chewing tobacco is unknown to the Indians of the Lower Oroonoko. I doubt a little the truth of this assertion, having been told, that the Sercucumas of the Erevato and the Caura, neighbours of the whitish Taparitoes, swallow tobacco chopped small, and impregnated with some other very stimulant juices, to prepare themselves for battle. Of the four species of nicotiana cultivated in Europe (n. tabacum, n. rustica, n. paniculata, and n. glutinosa,) we found only the two latter growing wild; but the nicotiana loxensis, and the n. andicola, which I found on the bank of the Andes, at 1850 toises of elevation, almost the height of the Peak of Teneriffe, are very similar to the n. tabacum and n. rustica ‡. The whole genus however is

* See my *Essai pol.*, vol. ii, p. 455.

† Vol. iii, p. 407.

‡ See our *Nov. Gen. et Spec.*, vol. iii, p. 4; Schlœzer, *Briefw.*, vol. iii, p. 153.

almost exclusively American, and the greater number of the species appeared to me to belong to the mountainous and temperate region of the tropics.

It is neither from Virginia, nor from South America, as it is said erroneously in several agricultural and botanical works, but from the Mexican province of Yucatan, that Europe received the first tobacco seeds, about the year 1559*. The man who has boasted most of the fecundity of the banks of the Oroonoko, the celebrated Raleigh, contributed most also to introduce the custom of smoking among the nations of the north. Already, at the end of the 16th century, bitter complaints were made in England "of this imitation of the manners of a savage people." It was feared, that by the practice of smoking tobacco *Anglorum corpora in barbarorum naturam degenerent*†.

* The Spaniards became acquainted with tobacco in the West India islands at the end of the 15th century. I have remarked above (vol. iii, p. 62.), that the cultivation of this narcotic plant preceded the beneficent cultivation of the potato in Europe more than 120 or 140 years. When Raleigh brought tobacco from Virginia to England in 1586, whole fields of it were already cultivated in Portugal.

† This remarkable passage of Camden is as follows, *Annal. Elizabet.*, p. 143 (1585); "ex illo sane tempore (tabacum) usu cepit esse creberrimo in Anglia et magno pretio dum quamplurimi graveolentem illius fumum per tubulum testaceum hauriunt et mox e naribus efflant, adeo ut Anglo-

When the Otomacs of Uruana by the use of niopo (of their arborescent tobacco), and of fermented liquors, have thrown themselves into a state of intoxication, which lasts several days, they kill one another without ostensibly fighting. The most vindictive among them poison the nail of their thumb with *curare ;* and, according to the testimony of the missionary, the mere impression of this poisoned nail may become mortal, if the *curare* be very active, and immediately mingle with the mass of the blood. When the Indians, after a quarrel at night, commit a murder, they throw the dead body into the river, fearing that some manifest indications of the violence exercised on the deceased might be observed. "Every time," said father Bueno, "that I see the women fetch water from a part of the shore, to which they are not accustomed to go for it, I suspect, that a murder has been committed in my mission."

We found in the Indian huts at Uruana the same vegetable substance (*touchwood of ants**),

rum corpora in barbarorum naturam degenerasse videantur, quum iidem ac barbari delectentur." We may see from this passage, that they emitted the smoke through the nose; but at the court of Montezuma the pipe was held in one hand, while the nostrils were stopped with the other, in order that the smoke might be more easily swallowed. *Life of Raleigh*, vol. i, p. 82.

* *Yesca de hormigas.*

with which we had become acquainted at the Great Cataracts, and which is employed to stop bleeding. This touchwood, which might less improperly be called *ants nests*, is much sought for in a region, the character of the inhabitants of which is so little pacific. A new species of ant, of a fine emerald green (formica spinicollis*), collects for it's habitation a cotton down, of a yellowish brown colour, and very soft to the touch, from the leaves of a melastomacea†. I have no doubt, that the *yesca* or *touchwood of ants* of the Upper Oroonoko (the animal is found, we were assured, only South of Atures) will one day become an article of trade. This substance is very superior to the *ants' nests* of Cayenne, which are employed in the hospitals of Europe, but can rarely be procured.

On the 7th of June we quitted with regret father Ramon Bueno. Among the ten missionaries, whom we had found in different parts of the vast extent of Guyana, he alone appeared to me to be attentive to all that regarded the natives. He hoped to return in a short time to Madrid, where he intended to publish the result

* *Puji* in Guaraken; *madi* in Equinabi. See the note which I added to the description of the formica spinicollis given by Mr. Latreille, in my *Obs. de Zoologie*, vol. ii, p. 101, Pl. xxxviii, fig. 6.

† The leaves of the *guari* tree, are covered on the lower surface with a reddish down.

of his researches on the figures and characters that cover the rocks of Uruana. It was in the countries we had just passed through, between the Meta, the Arauca, and the Apure, that, at the time of the first expeditions to the Oroonoko, for instance that of Alonzo de Herera, in 1535, *mute dogs* were found, called by the natives *maios*, and *auries**. This fact is curious in many points of view. We cannot doubt that the dog, whatever father Gili may assert, is indigenous in South America. The different Indian languages furnish words to designate this animal, which are scarcely derived from any European tongue. To this day the word *auri*, mentioned three hundred years ago by Alonzo de Herera, is found in the Maypure†. The dogs we saw at the Oroonoko may perhaps have descended from those, that the Spaniards carried to the coast of Caraccas; but it is not less certain, that there existed a race of dogs before the conquest in Peru, in New Grenada, and in Guyana, resembling our shepherds' dogs. The *allco* of the natives of Peru, and in general all the dogs that we found in the wildest countries of South America, bark frequently. The first historians however all speak of mute dogs *(perros mudos)*; they still exist in Canada; and, what appears to

* *Herera*, Decad. V, vol. iii, p. 212.

† *Gili*, vol ii, p. 378.

me worthy of attention, it was this dumb variety that was eaten in preference in Mexico*, and at the Oroonoko. A very well informed traveller, Mr. Giesecke, who resided six years in Greenland, assured me, that the dogs of the Eskimoes, which pass their lives in the open air, and bury themselves in winter beneath the snow, equally do not bark, but howl like wolves†.

The practice of eating the flesh of dogs is now entirely unknown on the banks of the Oroonoko; but, as it is a Tatar custom spread through all the eastern part of Asia, it appears to me highly interesting for the history of nations, to have ascertained, that it existed heretofore in the hot regions of Guyana, and on the table-lands of Mexico. I must observe also, that on the confines of the province of Durango, at the northern extremity of New Spain, the Cumanches have preserved the habit of loading the backs of the great dogs, that accompany them in their migra-

* See on the Mexican *techichi*, and on the numerous difficulties, that occur in the history of mute dogs, and dogs destitute of hair, my *Tableaux de la Nature*, vol. i, p. 117-124.

† They sit down in a circle; one of them begins to howl alone, and the others follow in the same tone. The groupes of alouate monkeys howl in the same manner, and among them the Indians distinguish "the leader of the band." See above, vol. iv, p. 267. It was the practice at Mexico to castrate the mute dogs, in order to fatten them. This operation must have contributed to alter the organ of the voice. See *Antiqued. del Mex. por el Cardinal Lorenzana*, p. 103.

tions*, with their tents of buffalo leather. It is well known, that employing dogs as beasts of burden and of draught is equally common near the Slave Lake, and in Siberia. I dwell on these features of conformity in the manners of nations, which become of some weight, when they are far from solitary, and are connected with the analogies furnished by the structure of languages, the division of time, and religious creeds and institutions.

We passed the night at the island of Cucuruparu†, called also *Playa de la Tortuga*, because the Indians of Uruana go thither to collect the turtles' eggs. It is one of the best determined points of latitude along the banks of the Oroonoko. I was there fortunate enough to observe the passage of three stars over the meridian‡.

* See the Journal of the Tour of Bishop Tamaron, fol. 7 (manuscript), and my *Essai polit.*, vol. i, p. 290.

† *Gili* (vol. i, p. 99) writes *Curucuruparu*.

‡ See vol. iv, p. 479. I found by α of the Southern Cross 7° 15′ 30″; by α of the Centaur, 7° 15′ 43″; by β of the Centaur, 7° 15′ 42″. I consider as doubtful, on my itinerary map, Pl. 16, the situation of the mouth of the *Cano de la Tortuga*. As the Oroonoko has the immense breadth of two thousand toises, and the boats do not descend along the same bank by which they go up, it is difficult to make the bearings tally. Between Caycara and the Great Cataracts I determined astronomically San Rafael del Capuchino, the mouth of the Apure, the island of Cucuruparu, the mission of Uruana, and Atures. I could determine only the longitude of

To the east of the island is the mouth of the *Cano* de la Tortuga, which descends from the mountains of Cerbatana, continually wrapped in electric clouds. On the southern bank of the Cano, between the tributary streams Parapara and Oche, lies the almost ruined mission of San Miguel de la Tortuga. The Indians assured us, that the environs of this little mission abound in otters with a very fine fur, called by the Portugueze *water dogs**; and, what is still more remarkable, in lizards *(lagartos)* with *two feet.* The whole of this country, very accessible between the Rio Cuchivero and the strait of Baraguan, is worthy of being visited by a well-informed zoologist. The *lagarto,* destitute of hinder extremities, is perhaps a species of syren, different from the siren lacertina of Carolina. If it were a saurien, a real bimanis (chirotes, Cuv.), the natives would not have compared it to a lizard. Beside the arau turtles, of which I have given above† a detailed account, an innumerable quantity of land tortoises also, called *morocoi,* are found on the banks of the Oroonoko, between Uruana and Encaramada. During

the mouth of the Meta; and, to improve the geography of the Oroonoko, I recommend to travellers furnished with accurate instruments, to ascertain the latitude of la Boca de Meta, Carichana, and Encaramada.

* *Perritos de agua;* in Maypure *nevi.*

† Vol. iv, p. 475-495.

the great heats of summer, in the time of drought, these animals remain hidden, without taking food, beneath stones, or in the holes which they have dug. They issue from their shelter, and begin to eat, only when they perceive the humidity of the first rains penetrate into the earth. The *terekays*, or *tajelus*, turtles that live in fresh water, have the same habits*. I have already spoken of the *summer sleep* of some animals of the tropics†. As the natives know the holes in which the tortoises sleep amid the dried lands, they get out a great number at once, by digging fifteen or eighteen inches deep. Father Gili says, that this operation, which he had seen, is not without danger, because the serpents often bury themselves in summer with the *terekays*.

From the island of Cucuruparu, as far as the capital of Guyana, vulgarly called *Angostura*, we were but nine days on the water. The distance is a little less than ninety-five leagues. We seldom slept on shore; but the torment of the moschettoes diminished sensibly in proportion as we advanced. We landed on the 8th of June at a farm *(hato de San Rafael del Capuchino)*, opposite the mouth of the Rio Apure. I obtained some good observations of latitude and longi-

* *Gili*, vol. 1, p. 257.

† See above, vol iv, p. 380, 381; and my *Tableaux de la Nature*, vol. i, p. 50 and 183.

tude*. Having two months before taken horary angles on the bank opposite *Capuchino*, these observations were important for determining the rate of my chronometer, and connecting the situations on the Oroonoko with those on the shore of Venezuela. The situation of this farm, being at the point where the Oroonoko changes it's course, which was from south to north, and hence runs from west to east, is extremely picturesque. Granitic rocks† rise like islets amid vast meadows. From their tops we discerned toward the north the Llanos or steppes of Calabozo bounding the horizon. Long accustomed to the aspect of forests, this view powerfully struck the imagination. The steppes after sunset assume a tint of greenish gray. The visual ray being intercepted only by the rotundity of the Earth, the stars seemed to rise as from the bosom of the ocean, and the most experienced

* I had found, April the 4th, for the Boca del Rio Apure (on the western bank of the Oroonoko), the lat. 7° 36′ 30″; the longitude 69° 7′ 30″; June the 8th, I found, for the Hato del Capuchino (on the eastern bank of the Oroonoko), the lat. 7° 37′ 45″; the long. 69° 5′ 30″. See my *Obs. Astr.* vol. i, p. 244.

† They are Punto Curiquima, Cerro del Capuchino, or Pocopocori, Cerro Sacuima, and Pan de Azucar de Caycara, on the right bank of the Oroonoko; Loma de Cabruta, Cerro Aguaro, and Coruato (the refuge of Indian malefactors, who have deserted from the neighbouring missions), on the left bank of the Oroonoko.

mariner would have fancied himself placed on a projecting cape of a rocky coast. Our host was a Frenchman*, who lived amid his numerous herds. Though he had forgotten his native language, he seemed pleased to learn, that we came from his country, which he had left forty years before; and he wished to retain us for some days at his farm. The political revolutions of Europe were to him almost unknown. He saw only a movement against the clergy and the monks; and observed, that "this movement would last as long as the monks continued to make resistance." This manner of seeing was very natural for a man, who had passed his life on the borders of the missions, and who had heard unceasingly of the conflict between the secular and ecclesiastical powers. The small towns of Caycara and Cabruta were only a few miles distant from the farm; but during part of the year our host was in complete solitude. The *Capuchino* becomes an island by the inundations of the Apure and the Oroonoko, and the communication with the neighbouring farms can be kept up only by means of a boat†. The

* M. François Doizan.

† To the south west are *Hato del Re*, and *Hato de San Antonio*. From Uruana as far as the mouth of the Cuchivero, the vegetation of these countries appeared to us to be characterized in the savannahs by isolepis squarrosa, i. vahlii, i. *gracilis*, oplismenus *Burmanni*; and in woody places by the

horned cattle then seek the higher grounds, that extend on the south toward the chain of the mountains of Encaramada. This granitic chain is intersected by vallies, which contain magnetic sands (granulary oxidulated iron), owing no doubt to the decomposition of some amphibolic or chloritic strata.

On the morning of the 9th of June we met a great number of boats laden with merchandize, sailing up the Oroonoko, in order to enter the Apure. This is a commercial road much frequented between Angostura and the port of Torunos in the province of Varinas. Our fellow traveller, Don Nicolas Soto, brother in law to the governor of Varinas, took the same course, to return to his family. At the period of the high waters, several months are lost in striving against the currents of the Oroonoko, the Apure, and the Rio de Santo Domingo. The boatmen are forced to carry out ropes to the trunks of trees, and thus warp their canoes up. In the great sinuosities of the river whole days are sometimes passed without advancing more than two

beautiful apeiba or aubletia tibrbu, plumeria *mollis*, allamanda *cathartica*, echites *macrophylla*, bignonia *salicifolia*, b. *carichanensis*, b. *verrucosa*, sabicea *hirsuta*, piper *anisatum*, and rubia *orinocensis*. We were surprised to find this latter plant, which belongs to the almost northern group of the *stellatæ*, among the rubiaceæ of the low regions of the tropics. (Brown, on the Plants of the Congo, p. 28.)

or three hundred toises. Since my return to Europe, the communications between the mouth of the Oroonoko and the provinces situate on the eastern slope of the mountains of Merida, Pamplona, and Santa Fe de Bogota, are become more active; and it may be hoped, that steamboats will facilitate these long voyages on the Lower-Oroonoko, the Portuguesa, the Rio Santo Domingo, the Orivante, the Meta, and the Guaviare. Magazines of cleft wood might be formed, as on the banks of the great rivers of the United States, sheltering them under sheds. This precaution would be indispensable, as, in the country through which we passed, it is not easy to procure dry fuel fit to keep up a brisk fire beneath the boiler of a steam engine.

We disembarked below San Rafael del Capuchino, on the right, at the Villa de Caycara, near a cove called *Puerto Sedeno*. It is a collection of a small number of houses, that bears the pompous name of *villa*. Alta Gracia, la Ciudad de la Piedra, Real Corona, Borbon, all the *towns* that lie between the mouth of the Apure and Angostura, are equally miserable. I mentioned above, that the presidents of the missions, and the governors of the provinces, had formerly the habit of demanding the privileges of *villas* and *ciudades* at Madrid, the moment the first foundations of a church were laid. This was a means of persuading the ministry, that the colo-

nies augmented rapidly in population and prosperity. Sculptured figures of the Sun and Moon, such as I have already mentioned, are found near Caycara, at the *Cerro del Tirano**. It is "the *work of the old people*" (that is of *our fathers)*, say the natives. On a rock more distant from the shore, and called Tecoma, the symbolic figures are found, it is said, at the height of a hundred feet. The Indians knew heretofore a road, that led by land from Caycara to Demerary and Essequebo. Did the tribes, that sculptured the figures† described by the traveller Hortsmann, come by this same road to the lake Amucu?

On the northern bank of the Oroonoko, opposite Caycara, is the mission of Cabruta, founded by the jesuit Rotella, in 1740, as an advanced post against the Caribbees. An Indian village,

* The tyrant who gave this name to these mountains is not Lope de Aguirre, but probably, as the name of the neighbouring cove seems to prove, the celebrated *conquistador* Antonio Sedeno; who, after the expedition of Herera, sought to penetrate by the Oroonoko to the Rio Meta. He was in a state of rebellion against the *audiencia* of Saint Domingo. I am ignorant however how Sedeno came to Caycara; for historians relate, that he was poisoned on the banks of the Rio Tisnado, one of the tributary streams of the Portuguesa. (*Frey Pedro Simon*, Not. 4, cap. 21, No. 3, p. 303. *Caulin*, p. 158).

† See above, p. 593.

known by the name of Cabritu*, had existed on the same spot for several ages. At the time when this little place became a Christian settlement, it was believed to be situate in the latitude of five degrees†, or two degrees forty minutes more to the south than I found it by direct observations made at San Rafael, and at la Boca del Rio Apure. No idea was then conceived of the direction of a road, that could lead by land to Nueva Valencia and Caraccas, which were supposed to be at an immense distance. The merit of having first crossed the Llanos, to get from the Villa de San Juan Baptista del Pao to Cabruta, belongs to a woman. Father Gili‡ relates, that Donna Maria Bargas was so passionately fond of the Jesuits, that she attempted herself to discover the way to the missions. She was seen with astonishment to arrive at Cabruta from the north. She took up her abode near the fathers of Saint Ignatius, and died in their settlements on the banks of the Oroonoko.

* A cacique of *Cabritu* received Alonso de Herera at his dwelling, on the expedition he attempted for going up the Oroonoko, in 1535.

† See the maps of Gumilla and Caulin. D'Anville ended by guessing better the latitude of Cabruta; which he places in the first edition of his *South America* at 5° 22′, but in the second at 7° 2′. The new map of Arrowsmith indicates this important point by the name of *Carula*.

‡ Vol. i, p. 54.

Since that period, the southern part of the Llanos has been considerably peopled; and the road, that leads from the vallies of Aragua by Calabozo to San Fernando de Apure and Cabruta, is much frequented. The chief of the famous *expedition of the boundaries* made choice of the latter place in 1754, to establish yards for building the vessels necessary for conveying his troops intended for the Upper Oroonoko. The little mountain, that rises north-east of Cabruta, can be discerned from afar in the steppes, and serves as a landmark for travellers.

We embarked in the morning at Caycara; and driving with the current of the Oroonoko, we first passed the mouth of the Rio Cuchivero, where an ancient tradition has placed the *Aikeam-benanos,* or women without husbands *; and we there reached the paltry village of Alta Gracia, which bears the name of a Spanish town. It was near this place, that Don Jose de Yturriaga founded the *pueblo de Ciudad Real,* which still figures on the most modern maps, though it has not existed for fifty years past, on account of the insalubrity of it's situation. After having passed the point where the Oroonoko turns to the east, forests are constantly seen on the right bank, and the Llanos or steppes of Venezuela on the left. The forests, which border the river,

* See above, p. 392.

are not however so thick as those of the Upper Oroonoko. The population augments perceptibly as you advance toward the capital: you find few Indians, but Whites, Negroes, and men of mixed descent. The number of the Negroes is not great; but here, as every where else, the poverty of their masters is far from procuring for them more humane treatment, and more favourable to their preservation. An inhabitant of Caycara, Mr. V——a, had just been condemned to four years imprisonment, and a fine of one hundred piastres, for having, in a paroxysm of rage, tied a Negress by the legs to the tail of his horse, and dragged her at full gallop through the savannah, till she expired of agony. I am glad to record, that the *Audiencia* was generally blamed in the country, for not having punished more severely so atrocious an action. Yet a small number of persons, who pretended to be the most enlightened and most sagacious of the community, deemed the punishment of a White contrary to sound policy, at the moment when the Blacks of Saint Domingo were in complete insurrection. When institutions that have become odious are menaced, men are never wanting, who, in order to maintain them, advise no relaxation of what they contain that is most hostile to reason and justice. Since I left those countries, civil dissensions have put arms into the hands of the slaves; and fatal experience

has led the inhabitants of Venezuela to regret, that they refused to listen to don Domingo Tovar, and other virtuous citizens, who, as early as the year 1795, lifted up their voices in the *cabildo* of Caraccas, to prevent the introduction of Blacks, and to propose means that might have meliorated their condition.

After having slept on the 10th of June in an island in the middle of the river, I believe that called Acaru by Father Caulin, we passed the mouth of the Rio Caura. This, the Aruy, and the Carony, are the largest tributary streams, that the Oroonoko receives on it's right bank. Having been able during my abode in the missions of Saint Francis, to collect many geographical materials respecting the Caura, I have traced a particular map of it *. All the Christian settlements are now found near the mouth of the river; and the villages of San Pedro, Aripao, Urbani, and Guaraguaraico, succeed each other at the distance of a few leagues. The first, which is the most populous, contains however but two hundred and fifty souls. That of San Luis de Guaraguaraico is a colony of Negroes, either freed or fugitives from Essequibo, which merits the particular attention of government. It can never be sufficiently recommended, to

* *Atlas geogr.*, Pl. 20. See above, on the Rio Caura, p. 34, and 606.

endeavour to attach the slaves to the soil, and suffer them to enjoy as farmers the fruits of their agricultural labours. The land on the Caura, for the most part a virgin soil, is extremely fertile. There are pasturages for more than 15,000 beasts; but the poor inhabitants have neither horses nor horned cattle. More than six sevenths of the banks of the Caura are either desert, or occupied by independent and savage tribes. The bed of the river is twice choked up by rocks; occasioning the famous Raudales of Mura and of Para or Paru, the latter of which has a *portage*, because it cannot be passed by canoes. At the time of the expedition of the boundaries, a small fort was erected on the northern cataract, that of Mura. The governor, don Manuel Centurion, hastened to give the name of *Ciudad de San Carlos* to a few houses, which some Spanish families (that is to say, not Indians), consisting of Whites and Mulattoes, had constructed near the fort. South of the cataract of Para, at the confluence of the Caura and the Erevato, the mission of San Luis was then found; and a road by land led thence to Angostura, the capital of the province. All these attempts at civilization have been fruitless. No village any longer exists above the Raudal of Mura; and here, as in many other parts of the colonies, the natives have as we may say reconquered the country from the Spaniards.

The valley of Caura, however, may become one day or other highly interesting from the value of it's productions, and the communications which it furnishes with the Rio Ventuari, the Carony, and the Cuyuni. I have shown above the importance of the four tributary streams, which the Oroonoko receives from the mountains of Parima. Near the mouth of the Caura, between the villages of San Pedro de Alcantara and San Francisco de Aripao, a small lake of four hundred toises in diameter was formed in 1790, by the sinking in of the ground, in consequence of an earthquake *. It was a portion of the forest of Aripao, which sunk to the depth of eighty or a hundred feet below the level of the neighbouring land. The trees remained green for several months; and some of them, it was believed, continued to push forth leaves beneath the water. This phenomenon is the more worthy of attention, as the soil of these countries is probably granitic. I doubt the secondary formations of the Llanos being continued toward the south as far as the valley of Caura.

The 11th of June we landed on the right bank of the Oroonoko at *Puerto de los Frailes* †, at the

* On Saint Mathew's day, in 1790, at three o'clock in the morning.

† Opposite the granitic rock called *Piedra de Don Ignacio*, after the name of a famous smuggler, who roamed the country between the Essequebo and the *Llanos* of Caraccas.

distance of three leagues above the *Ciudad de la Piedra*, to take altitudes of the Sun. The longitude of this point is 67° 26′ 20″, or 1° 41′ east of the mouth of the Apure. Farther on, between the towns of la Piedra and Muitaco, or Real Corona, occur the *Torno* and the *Mouth of Hell*, two obstacles, which were formerly dreaded by voyagers. The Oroonoko suddenly changes it's direction; it flows first to the east, then to the north-north-west, and then again to the east. A little above the *Canno* Marapiche, which opens on the northern bank, a very long island divides the river into two branches. We passed on the south of this island without difficulty; toward the north a chain of small rocks, half covered when the water is high, forms whirlpools and rapids. This is what is called *la Boca del Infierno*, and the *Raudal de Camiseta*. The first expeditions of Diego de Ordaz (1531) and Alonso de Herera (1535) have given celebrity to this bar. The Great Cataracts of the Atures and Maypures were then unknown; and the clumsy vessels *(vergantines)*, in which travellers persisted in going up the river, rendered the passage through the rapids extremely difficult. At present no apprehension is felt in ascending or descending the Oroonoko, at any season, from it's mouth as far as the confluence of the Apure and the Meta. The only falls of water in this space are those of Torno or Camiseta, Marimara,

and Cariven, or Carichana Vieja *. Neither of these three obstacles is to be feared with experienced Indian pilots. I dwell on these hydrographic details, because a great political and commercial interest is now connected with the communications between Angostura and the banks of the Meta and the Apure, two rivers that lead to the eastern side of the Cordilleras of New Grenada. The navigation from the mouth of the Lower Oroonoko to the province of Varinas is difficult only on account of the force of the current. The bed of the river no where presents obstacles more difficult to vanquish, than those of the Danube between Vienna and Lintz. We meet with no great bars, no real cataracts, but above the Meta. The Upper Oroonoko therefore, with the Cassiquiare and the Rio Negro, forms a particular system of rivers, where the active industry of Angostura and the shore of Caraccas will remain long unknown.

I obtained horary angles of the Sun in an island in the midst of the *Boca del Infierno*, where we had set up our instruments †. The longitude of this point according to the chronometer is 67° 10′ 31″. I attempted to determine the magnetic dip and intensity, but was pre-

* See vol. iv, p. 544 and 562.

† At 9h 20′ in the morning, the thermometer at the surface of the Oroonoko 28·2° cent.; in the air, 26·6°; hygr. 88° Sauss.; sky cloudy.

vented by a heavy storm of rain. As the sky became serene again in the afternoon, we went to rest that night on a vast beach, on the southern bank of the Oroonoko, nearly in the meridian of the little town of Muitaco, or Real Corona. I found the latitude by three stars* to be 8° 0′ 26″, and the longitude 67° 5′ 19″. When the Observantin monks in 1752 made their first *entradas* on the territory of the Caribbees, they constructed on this spot a small fort, or *casa fuerte*. The proximity of the lofty mountains of Araguacais renders Muitaco one of the most healthy places on the Lower Oroonoko. There Yturriaga took up his abode in 1756, to repose himself after the fatigues of the expedition of the boundaries; and, as he attributed his recovery to this hot rather than humid climate, the town, or more properly the village, of Real Corona took the name of *pueblo del Puerto sano*. In going down the Oroonoko more to the east, we left the mouth of the Rio Pao on the north, and that of the Arui on the south. The latter river is somewhat considerable, and is often mentioned by Raleigh. Geographers have long made the *Aroy* or *Arvi (Arui)*, the *Caroli*

* See my *Obs. Astr.*, vol. i, p. 247. The latitude of Real Corona is consequently near 70° 59′ 20″. This result accords accidentally, within a few seconds, with that which the astronomers of the expedition of the boundaries found in 1756. (*Caulin*, p. 56.)

(Carony), and the *Coari* (Caura)*, take their rise from the famous lake Cassipa, for which they afterward substituted the *Laguna del Dorado*. The current of the Oroonoko diminished in velocity as we advanced. I measured several times a basis along the beach, to ascertain the time which floating bodies took in traversing a known distance. Above Alta Gracia, near the mouth of the Rio Ujape, I had found the velocity of the Oroonoko 2·3 feet in a second; between Muitaco and Borbou it was only 1·7 foot. The barometric observations made in the neighbouring steppes prove the smallness of the slope of the ground from the longitude of 69° to the eastern coast of Guyana. We found in this country, on the right bank of the Oroonoko, small formations of primitive *gruenstein*, superimposed on granite (perhaps even embedded in the rock). We saw between Muitaco and the island of Ceiba a hill entirely composed of balls with contentric layers; in which we perceived an intimate mixture of hornblende and feldspar, with some traces of pyrites. The *gruenstein* resembles that in the vicinity of Caraccas; but it was impossible to ascertain the position of a formation, which appeared to me to be of the same age as

* The names printed in Italics are the names of the Arui, Carony, and Caura, as disfigured by Raleigh and the geographers Hondius and Sanson.

the granite of Parima. Muitaco was the last spot where we slept in the open air on the shore of the Oroonoko: we navigated two nights more before we reached Angostura, which terminated our voyage. This navigation in the middle of the *thalweg* of a great river is extremely pleasant; there is nothing to be feared except those natural rafts, formed by trees which the river roots up, when overflowing it's banks. When the nights are dark, canoes are liable to strike against these floating islands, as upon sand-banks.

It would be difficult for me to express the satisfaction we felt on landing at Angostura, the capital of Spanish Guyana. The inconveniences that are undergone at sea in small vessels cannot be compared to those, that are suffered under a burning sky, surrounded by a swarm of *moschettoes*, and lying whole months stretched along in a canoe, which on account of it's instability does not permit of taking the least bodily exercise. In seventy-five days we had made a voyage of five hundred leagues (twenty to a degree) on the five great rivers, Apure, Oroonoko, Atabapo, Rio Negro, and Cassiquiare; and in this vast space we had found but a very small number of inhabited places *. Although, after the life we had

* I shall here note for the use of persons who inhabit those countries the following itinerary distances. From San Fer-

led in the woods, our dress was not in very good order, Mr. Bonpland and I hastened to present ourselves to Don Felipe de Ynciarte, the governor of the province of Guyana. He received us in the most obliging manner, and made us lodge with the secretary of the intendance. Coming from an almost desert country, we were struck with the bustle of a town, which has only six thousand inhabitants. We admired the conveniences, with which industry and commerce furnish civilized man. Humble dwellings appeared to us magnificent; and every person, with whom we conversed, seemed to be endowed with superior intelligence. Long privations give a value to the smallest enjoyments; and I cannot express the pleasure, with which we saw for the first time wheaten bread on the governor's table. I am perhaps wrong in recording sensations, that are familiar to all those who have made distant voyages. We enjoy the happiness of finding

nando de Apure to Cabruta, 34 nautical leagues; from Cabruta, or from the confluence of the Oroonoko and the Apure, to Javita, 120 l.; from Javita to San Carlos del Rio Negro, 30 l.; from San Carlos to Esmeralda, 70 l.; from Esmeralda to Angostura, 250 l. Supposing the sources of the Oroonoko to be 30 leagues east of Esmeralda, we find, that the course of the Upper Oroonoko above the Raudale of Maypures comprises 175 leagues; the Lower Oroonoko (from Maypures to the mouths of the river) 260 l. In these estimations the sinuosities of the rivers are assumed, with Mr. de la Condamine, to be one third of the direct distance.

ourselves again in the midst of civilization ; but this happiness is of short duration to persons, who are powerfully affected by the marvels, with which nature has embellished the torrid zone. The fatigues we have endured are soon forgotten ; and we have scarcely reached the coast, the region inhabited by European colonists, when we form the project of returning to the interior of the country.

A painful circumstance obliged us to sojourn a whole month in the town of Angostura. We felt ourselves on the first days after our arrival tired and weakened, but in perfect health. Mr. Bonpland began to examine the small number of plants, which he had been able to save from the influence of so damp a climate ; and I was occupied in settling by astronomical observations the longitude and latitude of the capital *, as

* I found the latitude of Santo Tomas de la Nueva Guyana, vulgarly called *Angostura*, or the *Strait*, near the cathedral 8° 8′ 11″; the longitude, 66° 15′ 21″. (*Obs. Astr.*, vol. i, p. 249.) The town is consequently only 0° 15′ east of the meridian of the castle of St. Antonio at Cumana. La Cruz and Faden had placed it from 20′ to 30′ too much to the east, and 4′ too much to the south. The dip of the magnetic needle at Angostura, according to my observations, was 39° cent. div. The intensity of force was expressed by 222 oscillations in 10′ of time. It is remarkable, that the isodynamic line of Angostura passes through Calabozo (geogr. lat. 8° 58′ 3″), where the dip is only 0°3° less. See vol. iv, p. 377, 378.

well as the dip of the magnetic needle. These labours were soon interrupted. We were both attacked almost on the same day by a disorder, which with my fellow-traveller took the character of an ataxic fever. At this period the air was in a state of the greatest salubrity at Angostura; and as the only mulatto servant we had brought from Cumana felt the symptoms of the same disorder, the persons who took unwearied care of us had little doubt, that we had imbibed the germe of the typhus in the damp forests of Cassiquiare. It is common enough for travellers, to feel no effects from miasmata till the moment when, having reached a purer atmosphere, they begin to enjoy some repose. A certain excitement of the mental powers may suspend for some time the action of pathogenic causes. Our mulatto servant having been much more exposed to the rains than we were ourselves, his disorder increased with frightful rapidity. His prostration of strength was so great, that on the ninth day his death was announced to us. He was however only in a state of swooning, which lasted several hours, and was followed by a salutary crisis. I was attacked at the same time with a very violent fever, and in the middle of the fit was made to take a mixture of honey and of the extract of the bark of Carony *. This is a remedy much boasted of in

* Extract of the *cortex Angosturæ*.

the country by the Capuchin missionaries. The intensity of the fever augmented, but it left me on the following day. Mr. Bonpland remained in a very alarming state, which during several weeks gave us the most serious inquietude. Fortunately he preserved sufficient strength of mind, to prescribe for himself; and preferred gentler remedies, better adapted to his constitution than the extract of the bark of Carony. The fever was continual; and, as almost always happens within the tropics, a complication of dysentery aggravated the symptoms. In the course of this painful disease Mr. Bonpland displayed that courage and mildness of character, which never forsook him in the most trying situations. I was agitated by sad presages. The botanist Loefling, a pupil of Linneus, had died not far from Angostura, near the banks of the Carony, a victim of his zeal for the progress of natural history. We had not yet passed a year in the torrid zone; and my memory, too faithful, reminded me of every thing I had read in Europe on the dangers of the air that is breathed in the forests. Instead of going up the Oroonoko, we might have sojourned some months in the temperate and salubrious climate of the *Sierra Nevada* de Merida. It was I who had chosen the path of the rivers; and the danger of my fellow-traveller presented itself to my mind as the fatal consequence of this imprudent choice.

After having attained in a few days an extraordinary degree of *exacerbation*, the fever assumed a less alarming character. The inflammation of the intestines yielded to the use of emollients drawn from malvaceous plants. The sidas and the melochias have singularly active properties in the torrid zone; the recovery of the patient however was extremely slow, as it always happens with Europeans, who are not thoroughly seasoned to the climate. The period of the rains drew near; and in order to return to the coast of Cumana, it was necessary again to cross the Llanos, where, amid half-inundated lands, a shelter is rarely found, or any other nourishment than meat dried in the sun. To avoid exposing Mr. Bonpland to a dangerous relapse, we resolved to stay at Angostura till the 10th of July. We spent part of this time at a neighbouring plantation *, where mango trees and breadfruit trees † were cultivated. The latter had attained in the tenth year a height of more than forty feet. We measured several leaves of the arto-

* *Trapiche* of Don Felix Fareras.

† Artocarpus incisa. Father Andujar, Capuchin missionary of the province of Caraccas, zealous in the pursuit of natural history, has introduced the breadfruit tree from Spanish Guyana to Varinas, and thence to the kingdom of New Grenada. Thus the western coasts of America, bathed by the Pacific ocean, receive from the English settlements in the West Indies a production of the Friendly Islands.

carpus that were three feet long, and eighteen inches broad, remarkable dimensions in a plant of the family of the dicotyledons.

I shall terminate this chapter by a succinct description of Spanish Guyana *(Provincia de la Guyana)*, which is a part of the ancient *Capitania general* of Caraccas. Having made known at large whatever is remarkable on the banks of the Apure, the Oroonoko, the Atabapo, the Rio Negro, and the Cassiquiare, that relates to the history of our species, and of the productions of nature, it may be interesting to collect these scattered features, and trace the general picture of a country, which, awaiting a higher destiny, begins already to fix the attention of Europe. I shall first describe the situation of Angostura, the present capital of the province; and shall then trace the Oroonoko as far as the *delta*, which it forms at it's mouth. Making known at the same time the real course of the Rio Carony, the fertile banks of which contain the greater part of the Indian population of Guyana, I shall show from the history of geography the origin of those fabulous lakes, which long disfigured our maps.

Since the end of the sixteenth century three towns have successively borne the name of *Saint Thomas of Guyana*. The first was opposite the Island of Faxardo, at the confluence of the Carony and the Oroonoko. It was this which was

destroyed * by the Dutch, under the command of captain Adrian Janson, in 1579. The second, founded † by Antonio de Berrio, in 1591, near twelve leagues east of the mouth of the Carony, made a courageous resistance ‡ to Sir Walter Raleigh, whom the Spanish writers of the conquest know only by the name of the pirate *Reali.* The third town, now the capital of the province, is fifty leagues west of the confluence of the Carony. It was begun in 1764, under the governor Don Juacquin Moreno de Mendoza, and is distinguished in the public documents from the second town, vulgarly called the fortress *(el castillo, las fortalezas)*, or Old Guayana *(Vieja Guayana)*, by the name of *Santo Thomè de la Nueva Guayana.* This name being very long, that of Angostura § (the strait) has been

* *Laet, Nov. Orbis*, lib. 17, p. 660. *Gumilla*, vol. i, p. 31, 35, places erroneously the expeditions of Raleigh in the years 1545 and 1547. The first of the voyages undertaken at Raleigh's expense was in 1595; the second, that of Laurence Keymis, in 1596; the third, described by Thomas Masham, in 1597; and the fourth, in 1617. The first and last only were performed by Raleigh in person. This celebrated man was beheaded October the 29th, 1618. (*Harris's Coll.* vol. ii, p. 252.) It is therefore the second town of Santo Tomas, now called *Vieja Guyana*, which existed in the time of Raleigh.

† *Caulin*, p. 175, and not in 1586. (*Depons, Voyage à la Terre-Ferme*, vol. iii, p. 254.)

‡ *Fray Pedro Simon*, not. 7, Chap. xxii—xxviii, p. 635—661.

§ Europe has learnt the existence of a town of Angostura

commonly substituted for it. The inhabitants of those countries find it difficult to recognize on our maps, in Santiago de Leon and Santo Thomé, the two capitals of Venezuela and Guyana.

Angostura, the longitude and latitude of which I have already indicated from astronomical observations, stands at the foot of a hill of amphibolic schist * destitute of vegetation. The streets are regular, and for the most part parallel with the course of the river. Several of the houses are built on the bare rock; and here, as at Carichana, and in many other parts of the missions, the action of black and strong strata, when strongly heated by the rays of the Sun, upon the atmosphere, is considered as injurious to health. I think the small pools of stagnant water *(lagunas y anegadizos)*, which extend behind the town toward the south-east, are

by the trade carried on by the Catalonians in the Carony bark, which is the beneficial bark of the bonplandia trifoliata. This bark, coming from Nueva Guayana, was called *corteza* or *cascarilla del Angostura, cortex Angosturæ.* Botanists so little guessed the origin of this geographical denomination, that they began by writing *Augustura*, and then *Augusta.* Very recent political events have rendered the names of the small towns of Angostura, Calabozo, and even of San Fernando de Apure, familiar to those who feel an interest in the struggle between the colonies and the mother-country. The Raudal of Camiseta is called *Angustura* in the maps of Gumilla and D'Anville.

‡ *Hornblendschiefer.*

more to be feared. The houses of Angostura are lofty, agreeable, and the greater number built of stone; which construction proves, that the inhabitants have little dread of earthquakes. But unhappily this security is not founded on induction from very precise facts. It is true, that the shore of Nueva Andalusia sometimes undergoes very violent shocks, without the commotion being propagated across the Llanos. The fatal catastrophe of Cumana on the 4th of February, 1797, was not felt at Angostura; but in the great earthquake of 1766, which destroyed the same city, the granitic soil of the two banks of the Oroonoko was agitated as far as the Raudales of Atures and Maypures. South of these Raudales shocks are sometimes felt, which are confined to the basin of the Upper Oroonoko and the Rio Negro. They appear to depend on a volcanic focus distant from that of the Caribbee islands. We were told by the missionaries at Javita and San Fernando de Atabapo, that in 1798 violent earthquakes took place between the Guaviare and the Rio Negro, which were not propagated on the north toward Maypures. We cannot be sufficiently attentive to whatever relates to the simultaneity of the oscillations, and to the independance of the movements in contiguous ground. Every thing seems to prove, that the propagation of the commotion is not superficial, but depends on very deep crevices, that terminate in different centres of action.

The scenery around the town of Angostura is little varied; but the view of the river, which forms a vast canal stretching from the south-west to the north-east, is singularly majestic. The government, at the end of a long controversy on the defence of the place, and the reach of cannon shot, wished to know exactly the breadth of the Oroonoko at the point called *the strait*, where stands a rock *(el Pennon)*, that disappears entirely when the waters are at their height. Though there is an engineer attached to the provincial government, a few months before my arrival at Angostura don Mathias Yturbur had been sent from Caraccas, to measure the Oroonoko between the demolished fort of San Gabriel and the redoubt of San Rafael. I was told vaguely, that this measure had given a little more than eight hundred *varas castellanas*. The plan of the town, annexed to the great map of South America by La Cruz Olmedilla, indicates nine hundred and forty. I took with great care two trigonometric measurements, one in the strait itself, between the two forts of San Gabriel and San Rafael; the other east of Angostura, in the great walk *(Alameda)* near the *Embarcadero del Ganado*. The result of the first measure * (at the *minimum* of breadth) was three hundred and eighty toises; and that of the

* The base measured along the key, 245·6 met. Angles;

second * four hundred and ninety. These measures surpass four or five times that of the Seine near the Jardin des Plantes, and yet this part of the Oroonoko is called a *choking*, or a *strait*. Nothing is better fitted to give an idea of the mass of water of the great rivers of America, than the dimensions of these pretended straits. The Amazon, according to my measurement †, is two hundred and seventeen toises wide at the *Pongo* de Rentema; and according to Mr. de la Condamine, twenty-five toises at the *Pongo* de Manseriche, and at the *strait of Pauxis*, nine hundred toises. This last strait consequently differs little from the breadth of the Oroonoko at the strait of *Baraguan* ‡.

When the waters are high, the river inundates the keys; and it sometimes happens, that even in the town imprudent men become the prey of crocodiles. I shall transcribe from my journal a fact, that took place during Mr. Bonpland's

74° 33′ 10″ and 90°. Distance deduced 889 metres, or 456 toises; but we must subtract 76 toises, or the distance from *Punta* San Gabriel to the *Carcel* on the key. Now 456 t. — 76 = 380 t., or 395 *varas cast*.

* Base measured in the *Alameda*, 193·6 met. Angles; 78° 34′ 25″ and 90. Distance deduced, 958 met. = 491 t., or 1145 *varas*. The breadth naturally varies according to the rising of the waters.

† I measured the Amazon when the water was low, 400 toises above the mouth of the Rio Chinchipe.

‡ I found it to be 889 toises. See Chap. xix, vol. iv, p. 504.

illness. A Guaykeri Indian from the island de la Margaretta went to anchor his canoe in a cove, where there were not three feet of water. A very fierce crocodile, that habitually haunted that spot, seized him by the leg, and withdrew from the shore remaining on the surface of the water. The cries of the Indian drew together a crowd of spectators. This unfortunate man was first seen seeking with astonishing courage for a knife in the pocket of his pantaloons. Not being able to find it, he seized the head of the crocodile, and thrust his fingers into it's eyes. No man in the hot regions of America is ignorant, that this carnivorous reptile, covered with a buckler of hard and dry scales, is extremely sensible in the only parts of his body which are soft and unprotected, such as the eyes, the hollow underneath the shoulders, the nostrils, and beneath the lower jaw, where there are two glands of musk. The Guaykeri Indian had recourse to the same means which saved the Negro of Mungo Park, and the girl of Uritucu, whom I have mentioned above*: but he was less fortunate than they had been, for the crocodile did not open it's jaws, and lose hold of it's prey. The animal yielding to the pain plunged to the bottom of the river; and, after having drowned the Indian, came up to the surface of the water, dragging the dead body to

* Chap. xviii, vol. iv, p. 423.

an island opposite the port. I arrived at the moment when a great number of the inhabitants of Angostura had witnessed this melancholy spectacle.

As the crocodile, on account of the structure of it's larynx, of the hyoid bone, and of the folds of it's tongue, can seize, though not swallow, it's prey under water; a man seldom disappears, without the animal being perceived some hours after, near the spot where the misfortune has happened, devouring it's prey on a neighbouring beach. The number of individuals, who perish annually the victims of their own imprudence, and of the ferocity of these reptiles, is much greater, than it is believed to be in Europe. It is particularly so in villages, where the neighbouring grounds are often inundated. The same crocodiles remain long in the same places. They become from year to year more daring, especially, as the Indians assert, if they have once tasted of human flesh. These animals are so wary, that they are killed with difficulty. A ball does not pierce their skin; and the shot is only mortal, when directed at the throat, or beneath the shoulder. The Indians, who know little of the use of fire-arms, attack the crocodile with lances, after it is caught with large pointed iron hooks, baited with pieces of meat, and fastened by a chain to the trunk of a tree. They do not approach the animal till it has struggled a

long time to disengage itself from the iron fixed in the upper-jaw. There is little probability, that a country, in which a labyrinth of rivers without number brings every day new bands of crocodiles from the eastern back of the Andes, by the Meta and the Apure, toward the coast of Spanish Guyana, should ever be delivered from these reptiles. All that will be gained by civilization will be, to render them more timid, and more easily put to flight.

Affecting instances are related of African slaves, who have exposed their lives to save those of their masters, who had fallen into the jaws of a crocodile. A few years ago, between Uritucu and the *Mission de Abaxo* *, a Negro, hearing the cries of his master, flew to the spot armed with a long knife *(machette)*, and plunged into the river. He forced the crocodile, by putting out his eyes, to let go his prey, and hide himself under the water. The slave bore his expiring master to the shore; but all succour was unavailing to restore him to life. He died of suffocation, for his wounds were not deep. The crocodile, like the dog, appears not to close it's jaws firmly while swimming. It is almost superflous to add, that the children of the deceased, though poor, gave the slave his freedom.

The inhabitants of the banks of the Oroonoko

* In the *Llanos of Calabozo.*

and it's tributary streams discourse continually on the dangers, to which they are exposed. They have marked the manners of the crocodile, as the *torero* has studied the manners of the bull. They have learnt to judge previously, in some sort, of the movements of the animal, it's means of attack, and the degree of it's boldness. When they are assailed, they put in practice with that presence of mind, and that resignation, which characterize the Indians, the Zamboes, and copper-coloured men in general, the counsels they have heard from their infancy. In countries where nature is so powerful and so terrible, man is constantly prepared for danger. We have mentioned above the answer of the young Indian girl, who delivered herself from the jaws of the crocodile. "I knew he would let me go, if I thrust my fingers into his eyes." This girl belonged to the indigent class of the people, in whom the habits of physical want augment the energy of the character; but how can we avoid being surprised, to observe in the countries, convulsed by terrible earthquakes, on the table-land of the province of Quito, women belonging to the highest classes of society display in the moment of peril the same calm, the same reflecting intrepidity? I shall mention one example only in support of this assertion. On the 4th of February, 1797, when 35,000 Indians perished in the space of a few minutes, a young mother saved herself and her children,

crying out to them to extend their arms at the moment when the cracked ground was ready to swallow them up. When this courageous woman heard the astonishment that was expressed at a presence of mind so extraordinary, she answered with great simplicity, "I had been told in my infancy, if the earthquake surprise you in a house, place yourself under a doorway, that communicates from one apartment to another; if you be in the open air, and feel the ground opening beneath you, extend both your arms, and try to support yourself on the edge of the crevice." Thus in savage regions, or in countries exposed to frequent convulsions, man is prepared to struggle with the beasts of the forest, to deliver himself from the jaws of the crocodile, and to escape from the conflict of the elements.

Whenever, in very hot and damp years, pernicious fevers become common at Angostura, the problem is discussed, whether the government did right in transferring the town from the *Vieja Guayana* to the *Strait* between the island of Maruanta and the confluence of the Rio Orocopiche. It is asserted, that the ancient town, standing nearer the sea, enjoyed the advantage of the cooling breezes; and that the great mortality prevailing there was less owing to local causes, than to the way of living of the inhabitants. The fertile and

humid banks of the Oroonoko, below the mouth of the Carony, yield an immense quantity of squashes*, plantains, and *papaws*†. These fruits were eaten raw, even before they had reached their maturity; and the people being at the same time addicted to the use of spirituous liquors in excess, this improper way of living diminished the population from year to year. The archives of Caraccas are filled with memorials on the necessity of changing the seat of the present capital of Guyana. According to the official papers which have been communicated to me, it has been proposed sometimes to go back to the *Fortaleza* or *Vieja Guayana;* sometimes to place the capital close to the great mouth of the Oroonoko, ten leagues west of Cape Parima, at the confluence of the Rio Acquire‡; and sometimes to have it removed twenty-five leagues below Angostura, to the fine savannah that surrounds the Indian village of San Miguel. The government was no doubt influenced by a narrow policy in pretending, that, "for the better defence of the province, it was fit to place the capital at the enormous distance of eighty-five leagues from the sea, and to construct no town in this space, that could be exposed to the incursions of the ene-

* *Patillas.*

† Fruit of the carica papaya.

‡ Mr. de Pons calls it the Rio *Aguirre* (vol. iii, p. 333). Compare *Caulin,* p. 56.

my." Joined to the difficulty which European vessels find in going up the Oroonoko as far as Angostura (which is much greater than that of ascending the Potomac to Washington), the circumstance of the centre of commerce being placed above the point, where the banks of the river present most attraction to the activity of the colonists, is extremely unfavourable to agricultural industry. It is not even true, that the town of Angostura, or Santo Thomè de la Nueva Guayana, was founded where cultivation began in 1764: at that period, as at present, the great mass of the population of Guayana was contained in the missions of the Catalonian Capuchins, between the Rio Carony and the Cuyuni. Now this district, the most important of the whole province, and in which an enemy could procure necessaries of all kinds, is defended, or at least supposed to be so, by *Vieja Guayana*, but in no degree by the fortifications of the new town of Angostura.

The spot which has been proposed near San Miguel is a little to the east of the confluence of the Carony, consequently between the sea and that part of the country which is most inhabited. In going lower down, and transferring the capital of the province close to the mouth of the Oroonoko, as Mr. de Pons proposed, the proximity of the Caribbees, who are easily driven away, is less to be dreaded, than the possibility of an

enemy turning the place, and penetrating into the province by the small western mouths of the Oroonoko, the *Canos* of Macareo and Manamo. On a river, the *delta* of which begins to be formed at the distance of forty-six leagues from the ocean, the most advantageous situation for a great town depends on two circumstances, it's military defence, and the interests of commerce and of agriculture. Commerce requires, that the town should lie as near as possible to the great mouth of the river, *Boca de Navios ;* while military security leads to the preference of a spot *above* the formation of the *delta,* west of the point where the *Cano* Manamo separates from the principal trunk, and communicates by numerous bifurcations with the eight secondary mouths *(bocas chicas)* between the island of Congrejos and the mouth of the Rio Guarapiche. The situations both of *Vieja* and *Nueva Guayana* fulfil the latter condition ; and that of the ancient town has the farther advantage of covering to a certain point the fine establishments of the Catalonian Capuchins of Carony. The settlements may be attacked, by landing on the right bank of the *Brazo Imataca ;* but the mouth of the Carony, where the canoes feel the commotion of the waters of the neighbouring cataracts *(salto de Caroni)*, is defended by the forts of Vieja Guayana.

I have entered into these minute details, be-

cause political events have recently given great importance to those thinly inhabited countries. I have discussed the different projects according to the knowledge of the local circumstances of the Lower Oroonoko, which my situation and my connexions with the Spanish government enabled me to acquire. It is time to oppose the mania, so common in the Spanish and Portugueze colonies, of transplanting towns like a camp of nomade tribes. It is not the importance or solidity of the public edifices, which forbids the destruction of the town of Angostura. It's situation at the foot of a rock seems to limit the means of enlarging it. Notwithstanding these inconveniencies, however, it is better not to destroy what has prospered for fifty years. Ideas of general stability are insensibly annexed to the existence of a capital, however small; and, if the interests of commerce require a partial change, another port might be constructed nearer the great mouth of the Oroonoko, and Angostura be still preserved as the seat of administration, and the centre of public business. Thus, la Guayra is the harbour of Caraccas; and Vera Cruz may one day become the port of Xalapa. The vessels of Europe, and of the United States of America, that may come to stay some months in those latitudes, would willingly go as far up as Angostura; while other vessels would take

in their cargoes in the harbour nearest the Punta Barima, where in time of peace the magazines, ropewalks, and dock-yards, would be found. To protect the country between the capital and the harbour, or *Puerto de la Boca grande*, from a hostile invasion, the banks of the Oroonoko might be fortified according to a system of defence adapted to the nature of the ground; for instance, at Imataca or at Zacupana, at Barancas or at San Rafael (where the Cano Manamo separates from the principal trunk), at Vieja Guayana, at the island of Faxardo (opposite the mouth of the Rio Carony), and at the confluence of the Mamo. The little forts, constructed at a small expense, would serve at the same time as a refuge for the gun-boats stationed at the points, which the enemy's vessels must approach on tacking, to sail up against the current. I dwell so much the more on these means of defence, as they have been too long neglected*.

The northern coasts of South America are defended for the most part by a chain of mountains, that extends from west to east, and separates the shore from the Llanos of New-Anda-

* It is almost difficult to believe, that the whole defence of the province, during my stay at Angostura, depended on 7 *lanchas canoneras*, and six hundred soldiers of all complexions and descriptions, including what are called the garrisons of four frontier forts, the *destacamentos* of Nueva Guayana, San Carlos del Rio Negro, Guirior and Cuyuni.

lusia, Barcelona, Venezuela, and Varinas. It may be observed, that these coasts have fixed the attention of the mother country, too exclusively. There we find six strong places*, provided with a fine and numerous artillery; namely, Carthagena, San Carlos de Maracaybo, Porto-Cabello, La Guayra, le Morro de Nueva Barcelona, and Cumana. The eastern coasts of Spanish America, those of Guayana and Buenos Ayres, are low and without defence; they furnish to a daring enemy the facility of penetrating into the country as far as the eastern back of the Cordilleras of New Granada and Chili. The direction† of the Rio Plata, formed by the Uruguay, the Parana, and the Paraguay, forces an invading army, when it would march toward the east, to traverse the steppes *(pampas)* as far as Cordova or Mendoza; but north of the equator, in Spanish Guyana, the course‡ of the Lower Oroonoko and it's two great tributary streams, the Apure and the Meta, furnish in the direction of the latitude *a path of rivers,* which

* Those of Carthagena and Porto Cabello are of the first rank. In naming the points of defence from west to east, I might have mentioned also the batteries Santa Marta, Ciudad de la Hacha, and Coro; but these works are of little importance.

† From south to north, on an extent of land of twenty-two degrees of latitude.

‡ From west to east for thirteen degrees of longitude.

facilitates the transport of stores and provision. He who is master of Angostura may advance at will toward the north, in the steppes *(Llanos)* of Cumana, Barcelona, and Caraccas; toward the north-west, in the province of Varinas; and toward the west, in those of Cassanare, as far as the foot of the mountains of Pamplona. The plains of the Oroonoko, of the Apure, and of the Meta, alone separate the province of Spanish Guyana from the rich, populous, and well cultivated region near the seashore. The fortified places (Cumana, la Guayra, and Porto Cabello) scarcely protect this region from expeditions landing on the northern coast. I ground these statements on the configuration of the ground, and the present distribution of the points of defence. They will I think suffice to show, how intimately the political security of the United Provinces of Caraccas and New-Grenada is connected with the defence of the mouths of the Oroonoko; and how Spanish Guyana, though scarcely cleared, and destitute of population, acquires a high importance in the struggle between the colonies and the mother country. This military importance was foreseen more than two centuries ago by the celebrated Raleigh. In the account of his first expedition, he often recurs to the facility, with which queen Elizabeth might conquer a great part of the Spanish

colonies*, " by the course of the Oroonoko, and the innumerable rivers which run into it." We mentioned above, that Girolamo Benzoni predicted in 1545 the revolutions of the island of St. Domingo, " which must soon become the property of the Blacks." Here, in a work published in 1596, a plan of campaign is traced, the merit of which has been justified by recent events.

The town of Angostura in the early years of it's foundation had no direct communication with the metropolis. The inhabitants were contented with carrying on a trifling contraband trade in dried meat and tobacco with the West India islands, and with the Dutch colony of Essequibo, by the Rio Carony. Neither wine, oil, nor flour, three articles of importation the most sought after, was received directly from Spain.

* The *Discoverie of the Empire of Guiana.* Lond. 1596, p. 28, 95, and 100. In speaking of the defence of the mouth of the Oroonoko, Raleigh observes judiciously, and with great knowledge of the locality, " This country is besides so defensible, that if two fortes be builded in one of the provinces which I have seen, the flood setteth in so neere the bank, where the channel also lyeth, that no shippe can passe up, but within a pickes length of the artillerie; first of the one, and afterwardes of the other." He then adds, in that style of exaggeration, which appeared to him necessary in order to make his projects of conquest relished, " The two fortes will be a sufficient guarde both of the empire of Inga, and to an hundred other several kingdomes, lying within the said river, even to the citie of Quito in Peru."

Some merchants in 1771 sent the first schooner to Cadiz; and since that period a direct exchange of commodities with the ports of Andalusia and Catalonia has become extremely active. The population of Angostura*, after having been a long time languishing, has much increased since 1785: at the time of my abode in Guyana, however, it was far from being equal to that of Staebroeck, the nearest English town. The mouths of the Oroonoko have an advantage over every other part in Terra Firma. They afford the most prompt communications with the peninsula. The voyage from Cadiz to Punta Barima is performed sometimes in eighteen or twenty days. The return to Europe takes from thirty to thirty-five days. These mouths being placed to windward of all the islands, the vessels of Angostura can maintain a more advantageous commerce with the West Indies than La Guayra and Porto Cabello. The merchants of Caraccas therefore have been always jealous of the progress of indus-

* Angostura, or Santo Thomè de la Nueva Guayana, in 1768, had only 500 inhabitants. (*Caulin*, p. 63.) They were numbered in 1780, and the result was 1513 (455 Whites, 449 Blacks, 363 Mulattoes and *Zamboes*, and 246 Indians). The population in the year 1789 rose to 4590; and in 1800, to 6600 souls. (*Official Lists*, MS.) The capital of the English colony of Demerara, the town of Staebroeck, the name of which is scarcely known in Europe, is only fifty leagues distant, south-east of the mouths of the Oroonoko. It contains, according to Bolingbroke, nearly 10,000 inhabitants.

try in Spanish Guyana; and Caraccas having been hitherto the seat of the supreme government, the port of Angostura has been treated with still less favor than the ports of Cumana and Nueva Barcelona. With respect to the inland trade, the most active is that of the province of Varinas, which sends mules, cacao, indigo, cotton, and sugar to Angostura; and in return receives *generos*, that is, the products of the manufacturing industry of Europe. I have seen long boats *(lanchas)* set off, the cargoes of which were valued at eight or ten thousand piastres. These boats went first up the Oroonoko to Cabruta; then, along the Apure to San Vicente; and finally, on the Rio Santo Domingo, as far as Torunos*, which is the port of Varinas Nuevas. The little town of San Fernando de Apure, of which I have given a description above†, is the magazine of this river trade, which might become much more considerable by the introduction of steam boats.

The left bank of the Oroonoko, and all the mouths of this river, with the exception of the great *Boca de Navios*, belong to the province of Cumana. This circumstance gave rise long ago to the project of building another town opposite Angostura (where the battery of San Rafael is

* A little to the west of the town of Obispos.

† Chap, 18, vol. iv. p. 392.

now placed), in order to export the mules and dried meat of the Llanos from the territory of the province of Cumana itself, without crossing the Oroonoko. The little jealousies, that always subsist between two neighbouring governments, will serve to favor this project; but in the present state of the cultivation of the country it is to be wished, that it may be postponed yet a long time. Wherefore erect on the banks of the Oroonoko two rival towns, scarcely four hundred toises distant from each other?

I have now described the country through which we passed during a voyage of five hundred leagues; it remains for me to make known the small space of three degrees fifty-two minutes of longitude, that separates the present capital from the mouth of the Oroonoko. The exact knowledge of the *delta*, and of the course of the Rio Carony, is at once interesting to hydrography, and to European commerce. In order to judge of the extent and configuration of a country intersected by the branches of the Oroonoko, and subject to periodical inundations, I found it necessary to examine astronomically the situation of the points, in which the summit and the extreme branches of the *delta* terminate. Mr. de Churruca, who was appointed together with Don Juacquin Fidalgo, to survey the northern coasts of Terra Firma and the West India islands, has ascertained the latitude and longi-

tude of la Boca de Manamo, Punta Baxa, and Vieja Guayana. The Memoirs of Mr. Espinosa have made known to us the real situation of Punta Barima; so that on correcting the absolute longitudes by those of Puerto Espana in the island of Trinidad, and of the castle of Saint Antonio at Cumana, (two points settled by my own observations and the judicious researches of Mr. Oltmanns,) I think I can furnish statements sufficiently accurate. It is to be wished, that the difference of meridian between Puerto Espana and the little mouths of the Oroonoko, between San Rafael (the summit of the *delta*) and Santo Thomè del Angostura, may some day be determined by the chronometer in an uninterrupted voyage. The situation of the latter as I have given it rests on that of Cumana, and (by the confluence of the Apure) on Caraccas and Porto Cabello*.

* See my *Obs. Astr.*, vol, i, p. xxxviii. *Espinosa, Memorias de los Navegantes Espannoles*, vol. i, p. 81, and the *Carta esferica de Costas de Tierra Firma de Don Joaquin Francisco Fidalgo publicada en* 1816, compared with the sketches of the *Bocas del Orinoco*, which I procured at Angostura. The following are the results of my researches: *Punta Barima*, the eastern bank of the great mouth (Boca de Navios) of the Oroonoko, corrected by Puerto España and Portorico, according to Mr. Oltmanns, sixty-two degrees twenty-six minutes forty-six seconds; by Cumana, according to my direct observations, sixty-two degrees twenty minutes ten seconds, I have thought it right to fix on sixty-two degrees, twenty-three minutes, because the Spanish navigators set out from the island of Trini-

The whole eastern coast of South America, from Cape Saint Roque, and particularly from the port of Maranham*, as far as the group of the mountains of Paria, is so low, that it appears to me difficult to attribute the *delta* of the Oroonoko, and the formation of it's soil, to the accumulated mud of one river. I do not deny, that the *delta* of the Nile, according to the testimony of the ancients, was heretofore a gulf of the

dad, and I had settled the longitude of Angostura from that of Cumana, one of the points of America, the position of which rests on the most certain statements. *Boca de Manamo*, nearly the westernmost of the *bocas chicas del Orinoco*, sixty-four degrees forty-four minutes. *San Rafael*, near the point where the Cano Manamo, which forms the *bocas chicas*, separates from the principal trunk, sixty-four degrees eighteen minutes. *Viejo Guayana*, sixty-four degrees forty-three minutes. (The latitude observed on land by Churruca is eight degrees eight minutes twenty-four seconds; almost the same therefore as the latitude of Angostura, which I found to be eight degrees eight minutes eleven seconds. La Cruz and Arrowsmith place Vieja Guayana eighteen and twenty-six seconds north of Angostura.) *Santo Thomè del Angostura*, sixty-six degrees fifteen minutes twenty-one seconds.

* According to the excellent observations yet unpublished of Baron de Roussin, captain in the French navy, who has lately made a survey of the coast of Brazil, the latitude of Fort St. Antonio de la Barre is two degrees twenty-nine minutes two seconds south; longitude forty-six degrees thirty-four minutes fifty-nine seconds (supposing the fort Anathomirim in the island of St. Catherine fifty degrees fifty-one minutes fifteen seconds west of Paris).

Mediterranean, filled up by successive alluvions. It may be easily conceived, that at the mouth of all great rivers, where the velocity of the stream suddenly diminishes, a bank, an island, a deposition of substances which cannot be carried on farther, is formed. It may also be conceived, that the river, obliged to flow round this new bank, divides itself into two branches; and that the accumulating earth, finding a point of support at the summit of the *delta*, extends farther and farther, widening these branches*. What takes place at the first bifurcation may be effected in each partial channel; so that by the same processes, nature may form a labyrinth of small *bifurcated* channels, which are filled up or grow deeper in the lapse of ages, according to the force and direction of the waters. The principal trunk of the Oroonoko has no doubt in this manner divided itself, twenty-five leagues west of the *Boca de Navios*, into two branches, those of the Zacupana and Imataca. The network of less considerable branches which the rivers ends toward the north, and the mouths of which bear the name of *bocas chicas* (little mouths), appears to be a phenomenon entirely similar to that of the *deltas of tributary streams*†. When

* *Girard, sur la Vallée d'Egypte*, p. 56.

† On the *deltas* of *tributary streams* opposed to the *oceanic deltas*, see above, chap. xxiii, p. 466.

a river several leagues from the coast (for instance the Apure or the Jupura) joins another river by a great number of branches, these multiplied bifurcations are merely furrows traced in a very flat soil. It is the same with the *oceanic deltas*, wherever the coasts, by general inundations anterior to the existence of the Oroonoko and the Amazon, have been covered by depositions of accumulated earth. I doubt whether all these *oceanic deltas* have been gulfs, or, as some modern geographers say, *negative deltas*. When the mouths of the Ganges, the Indus, the Senegal, the Danube, the Amazon, the Oroonoko, and Missisippi, have been more carefully examined in a geological view, it will be perceived, that they have not all the same origin; the coasts that advance abruptly into the sea from the effect of increasing alluvions* will be distinguished from those, that follow the general configuration of the continents; lands formed by a *bifurcated* river will be distinguished from plains traversed by a few lateral branches, forming part of a soil of alluvions, the extent of which exceeds several thousand square leagues.

The *delta* of the Oroonoko, between the Isla Cangrejos and the Boca de Manamo, (the land inhabited by the Guaraon Indians,) may be

* Like the *deltas* of the Nile, the Ganges, the Danube, and the Missisippi.

compared to the island of Marajo or Joanes*, near the mouth of the Amazon. One of these pieces of alluvial land is on the north, the other on the south of the principal trunk of the river. But the form of the island Joanes is connected with the general configuration of the soil of the province of Maranhao, as the coasts of the *bocas chicas* of the Oroonoko are with that of Essequibo and the gulf of Paria. Nothing appears to me to prove, that this gulf extended formerly toward the south from the *boca de Manamo* as far as Vieja Guayana; or that the Amazon filled with it's waters the whole bay between Villa Vistoza and Grand Para. All that surrounds rivers is not their own work. They have most frequently scooped themselves out a bed in alluvial lands, the origin of which dates from more ancient geologic causes, from the great ca-

* This pretended island, which the jesuit Andrew da Barros asserts to be larger than the kingdom of Portugal, though it is only fifteen hundred square leagues, is inhabited by the Nhengahybas (or *Igaruanas*, that is, *boatmen*), who know the mouth of the Amazon as well as the Guaraons know that of the Oroonoko. The topography of the island Joanes, and of the vicinity of Belem or of Para, has little accuracy on the most recent maps. The following is the real state of things: a *very narrow channel* (the Tagypuru) issues from the Amazon below the Villa de Gurupa, and joins the lake Annapu near the town of Melgaço. The Rio Annapu, which is the Guanapu of D'Anville, falls into this lake. East of Melgaço, the Tagypuru receives the great river of the Tocantins, on which stands the town of Para.

tastrophes which our planet has undergone. It is proper to examine, whether between the *bifurcated* branches of a river the mud do not repose upon a stratum of pebbles, which are found far from running waters. The greatest separation of the branches of the Oroonoko is forty-seven nautical leagues. This is the breadth of the *oceanic delta* between Punta Barima and the westernmost of the *bocas chicas*. An exact survey of those countries being hitherto wanting, the number of the mouth is not known. A vulgar tradition gives seven to the Oroonoko, and reminds us of the *septem ostia Nili*, so celebrated in antiquity. But the *delta* of Egypt was not always confined to this number; and eleven considerable mouths at least may be counted on the inundated coast of Guyana*. After the *Boca de*

* *Boca de Navios*; *B. de Lauran* (Loran, Laurent); *B. de Nuina*, two or three leagues west of the Isla Cangrejos, and two or three fathoms deep; *B. chica de Mariusas*, five leagues farther, little known; *B. de Vinquinia*; *B. grande de Mariusas*, very navigable; *B. de Macareo* (the *cano* of this name admits large vessels as far as San Rafael, where it issues from the principal trunk); *B. de Cucuina*, narrower, but deeper; *B. de Pedernales*, navigable; *B. de Manamo grande*, near the islands of Plata and Pesquero; *B. de Guanipa*. From boca de Nuina to boca de Manamo grande, the partial distances were indicated to me at five, seven, eight, six, four, eight, and seven leagues. The synonymy of these branches of the Oroonoko is somewhat embarrassing. Is not the B. de Capure, between Pedernales

Navios, which mariners recognize by the Punta Barima, the *Bocas of Mariusas*, *Macareo*, *Pedernales*, and *Manamo grande*, are most useful for navigation. That part of the *delta*, which extends to the west of the *Boca de Macareo*, is bathed by the waters of the gulf of Paria, or *Golfo triste*. This basin is formed by the eastern coast of the province of Cumana, and the western coast of the island of Trinidad; it communicates with the Caribbean sea by the famous mouths of the Dragon (*Bocas de Dragos*), which the coasting pilots have regarded ever since the time of Christopher Columbus, though improperly, as the mouths of the Oroonoko*.

and Macareo, identical with the B. de Cucuina? Does not the Cano de Laurent, which is said to be extremely wide where it separates from the Oroonoko, and very narrow at it's mouth, lead to one of the two Bocas de Mariusas?

* The waters, which issue so impetuously from the *Bocas de Dragos* (See chap. 3, vol. ii, p. 29), are 1st, those of the Atlantic Ocean, the currents of which run toward the coast of Guyana through the *Canal del Sur* (between Punta de Mangles of the continent, and Punta Galiota of the island of Trinidad) west-north-west; 2d, the fresh waters of the *Bocas chicas* of the Oroonoko (of the *Canos* Pedernales and Manamo grande joined with that of the great Rio Guarapiche). It cannot be doubted, that the gulf of Paria formed heretofore an inland basin, when the island of Trinidad was still united on the north to cape Paria, and on the south-west (Punta de Icacos) to the Punto Foleto, situate east of the boca de Pedernales. Three small rocky islands, partly cultivated with cotton (*Islas de Monos, de Huebos* and *de Cha-*

When a vessel coming from sea would enter the principal mouth of the Oroonoko, the *boca de Navios*, it should make the land at the Punta Barima. The right or southern bank is the highest: the granitic rock pierces the marshy soil at a small distance in the interior, between the Canno Barima, the Aquire, and the Cuyuni. The left, or northern bank of the Oroonoko, which stretches along the *delta* toward the Boca de Mariusas and the Punta Baxa*, is very low; and is distinguishable at a distance only by the clumps of Mauritia palm-trees, which embellish the passage. This is the sago-tree † of the

cachacares) divide the passage, which is three or four leagues broad (between the north-west cape of the island of Trinidad, near the port of Chaguaramas, and the Punta de la Pena, the eastern extremity of the coast of Paria) into four small channels; *Boca de Monos*, *B. de Huebos*, *B. de Navios*, and *B. grande*. These mouths collectively are called *Bocas de Dragos*. There are some other small islands nearer the eastern coast of Paria (*El Fraile*, *El Pato*, and *El Patito*), the existence of which attests the convulsions, to which this country has been exposed.

* According to Churruca, lat. 9° 35′ 30″ (or 0° 54′ 55″ farther north than Punta Parima). I find the longitude to be 63° 21′, as deduced from my observations at Cumana.

† The nutritious fecula or *medullary flour* of the sago trees is found principally in a group of palms, which Mr. Kunth has distinguished by the name of *calameæ*. It is collected however in the Indian Archipelago as an article of trade from the trunks of the cycas revoluta, the phœnix farinifera, the corypha umbraculifera, and the caryota urens. (*Ainslie*, *Ma-*

country; it yields the flour of which the *yuruma* bread is made, and, far from being a *palm-tree* of the *shore*, like the chamærops humilis, the common cocoa-tree, and the lodoicea of Commerson, is found as a *palm-tree* of the marshes as far as the sources of the Oroonoko*.

teria Medica of Hindostan, Madras, 1813, p. 39.) The quantity of nutritious matter, which the real sago-tree of Asia affords (*sagus* Rumphii, or metroxylon sagu, Roxburgh), exceeds that which is furnished by any other plant useful to man. One trunk of a tree in it's fifteenth year sometimes yields six hundred pounds weight of *sago*, or meal (for the word *sago* signifies *meal* in the dialect of Amboina). Mr. Crawford, who resided a long time in the Indian Archipelago, calculates, that an English acre (four thousand and twenty square metres) could contain four hundred and thirty-five sago-trees, which would yield one hundred and twenty thousand, five hundred pounds *avoirdupois* of fecula, or more than eight thousand pounds yearly. (*History of the Indian Archipelago*, vol. i, p. 387 and 393.) This produce is triple that of corn, and double that of potatoes in France. But the plantain produces on the same surface of land still more alimentary substance than the sago-tree. (See my *Political Essay on New Spain*, vol. i, p. 363.)

* See above, p. 503. I dwell much on these divisions of the great and fine families of palms according to the distribution of the species: 1st, in dry places, or inland plains (corypha tectorum); 2d, on the sea coast (chamærops humilis, cocos nucifera, corypha maritima, lodoicea sechellarum, Labill.); 3d, in the fresh water marshes (sagus rumphii, mauritia flexuosa); and 4th, in the alpine regions between seven and fifteen hundred toises high (ceroxylon andicola, oreodoxa frigida, kunthia montana). This last

In the season of inundations these clumps of mauritia, with their leaves in the form of a fan, have the appearance of a forest rising from the bosom of the waters. The navigator, in proceeding along the channels of the *delta* of the Oroonoko at night, sees with surprise the summit of the palm-trees illumined by large fires. These are the habitations of the Guaraons (Tivitivas and Waraweties of Raleigh*), which are suspended from the trunks of trees. These tribes hang up mats in the air, which they fill with earth, and kindle, on a layer of moist clay, the fire necessary for their household wants. They have owed their liberty and their political independence for ages to the quaking and swampy soil, which they pass over in the time of drought, and on which they alone know how to walk in security to their solitude in the *delta* of the Oroonoko, to their abode on the trees, where religious

group of *palmæ montanæ*, which rises in the Andes of Guanacas nearly to the limit of perpetual snow, was (I believe) entirely unknown before our travels in America. (*Nov. Gen.* vol. i, p. 317; *Semanario de Santa Fe de Bogota*, 1819, No.21, p. 163.)

* The Indian name of the tribe of Uaraus (*Guarau-nos* of the Spaniards) may be recognized in the Warawety (*Ouarauety*) of Raleigh, one of the branches of the Tivitivas. See *Discovery of Guiana*, 1576, p. 90, and the sketch of the habitations of the Guaraons, in *Raleghi brevis Descrip. Guianæ*, 1594, *tab.* 4. (*Laet.* p. 648, 661; *Gili*, vol. i, p. xxxv; *Depons*, vol. i, p. 292, 308; *Leblond*, p. 430, 444.)

enthusiasm will probably never lead any American *stylites**. I have already mentioned in another place, that the mauritia palm-tree, the *tree of life* of the missionaries, not only affords the Guaraons a safe dwelling during the risings of the Oroonoko; but that it's shelly fruit, it's farinaceous pith, it's juice abounding in saccharine matter, and the fibres of it's petioles, furnish them with food, wine†, and thread proper for making cords and weaving hammocks. These customs of the Indians of the *delta* of the Oroonoko were found formerly in the Gulf of Darien (Uraba), and in the greater part of the inundated lands between the Guarapiche and the mouths of the Amazon. It is curious to observe in the lowest degree of human civilization the existence of a whole tribe depending on one single species of palm-tree, similar to those insects, which feed on one and the same flower, or on one and the same part of a plant.

We must not be surprised to find the breadth

* This sect was founded by Simeon Sisanites, a native of Syria. He passed thirty-seven years in mystic contemplation, on five pillars, the last of which was thirty-six cubits high. The *Sancti columnares* attempted to establish their aerial cloisters in the country of Treves, in Germany; but the bishops opposed these extravagant and perilous enterprises. (*Mosheim, Instit. Hist. Eccles.*, p. 192.)

† The use of this *murichi wine* however is not very common. The Guaraons prefer in general a beverage of fermented honey.

of the principal mouth of the Oroonoko *(Boca de Navios)* so differently estimated. The great Island Cangrejos is separated only by a narrow channel from the inundated land, which extends between the Bocas de Nuina and de Mariusas, so that twenty or fourteen nautical miles (at nine hundred and fifty toises) are obtained, according as the measure is taken (in a direction opposite to that of the current) from Punta Barima to the nearest opposite bank, or from the same Punta to the eastern bank of the Isla Cangrejos. The navigable channel is crossed by a sand-bank or bar, on which are seventeen feet of water; the breadth of which is supposed to be from two thousand five hundred to two thousand eight hundred toises. The Oroonoko, like the Amazon, the Nile, and all the rivers that separate into several branches, is less wide at the mouth, than might be supposed from the length of it's course, and the breadth it preserves at some hundred leagues inland. It is known from the labours of Malaspina, that the Rio de la Plata, from Punta del Este near Maldonado as far as Cabo San Antonio, is more than one hundred and twenty-four miles (41·3 leagues) broad; but in going up toward Buenos Ayres, this breadth diminishes so rapidly, that opposite the *Colonia del Sacramento* it is already no more than twenty-one miles. What is commonly called the mouth of

the Rio de la Plata is but a gulf, into which the Uruguay and the Parana fall, two rivers much less considerable in breadth than the Oroonoko. In order to exaggerate the breadth of the mouth of the Amazon, the islands of Marajo and Caviana are considered as comprised within it; so as to give the immense breadth of 3·5°, or 70 leagues, from la Punta Tigioca to Cabo del Norte. But an examination of the hydraulic system of the channel of Tagypuru, the Rio Tocantins, the Amazon, and the Araguari, which unite the immense volume of their waters, is sufficient to show, how chimerical this estimation is. Between Macapa and the western bank of the island Marajo *(ilha de Joanès)*, the Amazon, properly so called, is divided into two branches, which together are only thirty-two miles (eleven leagues) broad. Lower down, the northern bank of the island of Marajo stretches east and west, while the coast of Portugueze Guayana, between Macapa and Cabo del Norte, runs from south to north. Hence it follows, that the Amazon, where the two islands of Maxiana and Caviana are situate, and the waters of the river first come into contact with those of the Atlantic, forms a gulf nearly forty miles broad. The Oroonoko is inferior to the Amazon in the length of it's course, still more than in it's breadth within land: it belongs to the rivers of the second rank. But it must be remarked, that all these

classifications, from the length of the course, or the breadth of the mouth of rivers, are extremely arbitrary. The rivers of the British islands are terminated by gulfs or lakes of fresh water, in which the tides cause swellings and periodical oscillations; and remind us sufficiently, that we must not judge of the importance of an hydraulic system * merely from the extent of the mouths of rivers. Every idea of *relative magnitude* fails in precision, if we cannot compare the volume of the waters, ascertained by the measurement of the velocity, and the *area* of the transverse sections †. It is to be regretted, that measurements of this kind require facilities, which solitary travellers can scarcely procure; that, for instance, of sounding the whole bed of a river, and of sounding it at different times of the year. Rivers of great apparent breadth having basins of little depth, and traversed by several parallel furrows ‡, they contain much less water, than their first view would lead us to suppose; and the volume of their waters varies so considerably

* The Thames and the Severn; and in the New World the Rio Guayaquil, which rises at the foot of Chimborazo, and exhibits a striking disproportion between the brevity of it's course, and the breadth of it's mouth.

† For the knowledge of these active sections (*sections vives*) in the Ganges and the Nile we are indebted to the important labours of Major Rennell and Mr. Girard.

‡ See above, p. 464.

at the two periods of their *maximum* and *minimum* *, that during the floods it is often fifteen or twenty times as much as at the season of drought.

When we have doubled the Punta Barima, and entered the bed of the Oroonoko, we find it to be only three thousand toises in breadth. Greater estimations have arisen from the error of pilots in measuring the river in a line not perpendicular to the direction of the current. It would be useless to fortify the island of Cangrejos, near which the water is from four to five fathoms deep. Vessels there would be out of gun-shot. The labyrinth of channels that lead to the little mouths (*bocas chicas*) changes daily

* Mr. Girard found the volume of the Nile, at the port of Syout, in the time of low water, 678 cubit metres in a second, while the gauges gave him during the inundations 10247 cubic metres (*sur la Vallée d'Egypte*, p. 13). We may judge by analogy of the enormous increase of the Oroonoko, if we recollect, that it rises 25 feet in places where I found it's mean breadth to be 1000 toises. The following is a comparative table of some of the great rivers of the New World, calculating the *length of the course*, according to the most recent maps, and adding one third for the sinuosities:

The *Amazon*, 980 leagues, of 20 to a degree.

The Missisippi, 560 leagues, in going up by the principal branch to the Chippeway, but 815 leagues in going up to the sources of the Missouri.

The *Rio de la Plata*, 530 leagues, in going up by the Rio Paraguay.

The Oroonoko, the known part 420 leagues. (The Indus has a course of 510, and the Ganges of 426 leagues.)

in depth and figure. Many pilots are persuaded, that the Cannos of Cocuina, Pedernales, and Macareo, by which a smuggling trade is carried on with the island of Trinidad, have gained in depth of late years; and that the river has a tendency to withdraw from the *Boca de Navios*, and to run toward the north-west. Before the year 1760, barks that drew more than ten or twelve feet of water seldom ventured into the little channels of the *delta*. The fear of the *small mouths* of the Oroonoko has now almost vanished; and enemies' ships, which have never navigated in those parts, find officious and experienced guides in the Guaraons. The civilization of this tribe, which may be compared from it's situation to the Nhengahybas or Igaruanas of the mouths of the Amazon, is of the highest importance to a government that would remain master of the Oroonoko.

The flux and reflux of the tide are felt in the month of April, when the river is lowest, beyond Angostura, at a distance of more than eighty-five leagues * in the inland. At the con-

* The difference of longitude is 3° 52′. It may seem surprising, that, admitting here with common pilots only eighty-five nautical leagues distance, I estimate the sinuosities of the Oroonoko below Angostura only at one ninth. I believe, however, that this estimation is not too small; since, having measured on a very accurate manuscript map which I possess, with an opening of the compasses of 9′, the sinuosities of the

fluence of the Carony, sixty leagues from the coast, the water rises one foot three inches. These oscillations of the surface of the river, this *suspension* of it's course, must not be confounded with a tide that flows up. At the great mouth of the Oroonoko, near Cape Barima, the tide rises to a height of two or three feet; but farther

Oroonoko from the mouth of the Rio Mamo (ten leagues above that of the Carony) to Punta Barima, I found 207′; while an opening of the compasses of half a degree gave me 186′. We must not hence conclude, that La Condamine and d'Anville are in an error, when, in order to estimate the course of a river, they add in general one quarter or one third. (*Journal des Savans*, Jan. 1750, p. 183.) This point being of great importance for the construction of maps, I had much satisfaction in being able to verify it recently. The learned commentator on Strabo, Mr. Gosselin, has measured the sinuosities of the Nile on the great map of the institute of Egypt in forty-seven sheets, with an opening of the compasses of 1000 metres, or nearly one third of a nautical league; and he found the length of the course of the waters from Syene to Damietta 1,180,400 metres, or, at a mean degree, 637′ 35″ (near 212 nautical leagues of 5562 metres). *Geogr. de Strabon*, vol. v, p. 308. Now I found 173 leagues, with an opening of the compasses of half a degree, on the fine map of Colonel Leake. The sinuosities of a river, therefore, which is not very winding, were a little more than one quarter. D'Anville adopted this same proportion for the Napo and the Pastaza. In the most tortuous rivers nearly one third must be added, if the length of the course have been measured with an opening of the compasses from 30′ to 1°, that is, suppressing sinuosities less than this space. (*La Condamine, Voyage à l'Amazone*, p. 67.)

on toward the north-west, in the *Golfo triste*, between the *boca* de Pedernales, the Rio Guaripiche, and the western coast of Trinidad, the tides rise seven, eight, and even ten feet. Such is the influence of the configuration of the coast, and of the obstacles which the Mouths of the Dragon present to the running off of the waters, on points thirty or forty leagues distant from each other. All that is related in very recent works, on the particular currents caused by the Oroonoko at 2° or 3° distance in the open sea, on the changes observed in the colour of the sea, and on the fresh waters of the *Golfo Triste* (*Mar dulce* of Gumilla), is entirely fabulous. The currents, on the whole of this coast, run from Cape Orange toward the north-west; and the variations, which the fresh waters of the Oroonoko produce in the force of the general current, and in the transparency and the reflected colour of the sea, rarely extend farther than three or four leagues east-north-east of the island of Cangrejos. The waters in the *Golfo triste* are salt, though in a less degree than in the rest of the Caribbean Sea, on account of the small mouths of the *Delta* of the Oroonoko, and the mass of water furnished by the Rio Guarapiche. For these reasons there are no salt-pits on this coast; and I have seen vessels from Cadiz arrive at Angostura laden with salt, and (which characterises the state of colonial industry) even with bricks for building the cathedral.

The astonishing distance at which the little tides of the coast are felt in the bed of the Oroonoko and of the Amazon *, has been hitherto considered as a certain proof, that these two rivers have only a slope of a few feet during a course of eighty-five and of two hundred leagues. This proof however does not appear irrefragable, if we reflect, that the magnitude of the transmitted undulations depends much on local circumstances, on the form, the sinuosity, and the number of the channels of communication, the resistance of the bottom on which the tide flows up, the reflexion of the waters by the opposing banks, and their confinement in a straight. A skilful engineer † has recently shown, that, in the bed of the Garonne, the oscillations of the tides go up, as on an inclined plain, far above the level of the waters of the sea at the mouth of the river. At the Oroonoko, the tides of unequal height of Punta Barima and of *Golfe triste* are transmitted in unequal intervals of time by the great channel of the *Boca de Navios*, and by

* The river of Amazons swells periodically at the strait of Pauxis, 192 leagues from the coast.

† Mr. Bremontier. At la Réole the tide appears to flow ten toises, at Bourdeaux five toises, above the low-water mark near Royan. Yet the tides are the same height at Royan and at Bourdeaux. It were to be wished, that these data could be rectified by a more accurate survey. (*Recherches sur le Mouvement des Eaux*, p. 809, § 72 and 83.)

the narrow, winding, and numerous channels of the *bocas chicas*. As these little channels separate at one point only from the principal trunk near San Rafael, curious researches might be made on the retardation of the tides, and the propagation of the waves in the bed of the Oroonoko, above and below San Rafael, at Cape Barima in the ocean, and at the boca of Manamo in the *Golfe triste*. Hydraulic architecture, and the theory of the movement of fluids in contracted channels, would alike gain from a labour, for the execution of which the Oroonoko and the Amazon furnish peculiar facilities.

The navigation of the river, whether vessels arrive by the *Boca de Navios*, or risk entering the labyrinth of the *Bocas chicas*, requires various precautions, according as the *bed is full*, or the *waters very low*. The regularity of these periodical risings of the Oroonoko has been long an object of admiration to travellers, as the overflowings of the Nile furnished the philosophers of antiquity with a problem difficult to solve. The Oroonoko and the Nile, contrary to the direction of the Ganges, the Indus, the Rio de la Plata, and the Euphrates, flow alike from the south toward the north; but the sources of the Oroonoko are five or six degrees nearer the equator, than those of the Nile. Observing every day the accidental variations of the atmosphere, we find it difficult to persuade

ourselves, that in a great space of time the effects of these variations mutually compensate each other: that in a long succession of years the *means* of the temperature of the humidity, and of the barometric pressure, differ so little from month to month; and that nature, notwithstanding the multitude of partial perturbations, follows a constant type in the series of meteorologic phenomena. Great rivers unite in one receptacle the waters, which a surface of several thousands of square leagues receives. However unequal may be the quantity of rain, that falls during several successive years in such or such a valley, the swellings of rivers, that have a very long course, are little affected by these local variations. The swellings represent the *mean state* of the humidity, that reigns in the whole basin; they follow annually the same progression, because their commencement and their duration depend also on the *mean* of the periods, apparently extremely variable, of the beginning and end of the rains in the different latitudes, through which the principal trunk and it's various tributary streams flow. Hence it follows, that the periodical oscillations of rivers are, like the equality of temperature of caverns and springs, a sensible indication of the regular distribution of humidity and heat, which takes place from year to year on a considerable extent of land. They strike the imagination of the

vulgar, as order every where astonishes, when we cannot easily ascend to first causes; as the *means* of temperature of a long succession of months or years surprise those, who see for the first time a treatise on climates. Rivers that belong entirely to the torrid zone display in their periodical movements that wonderful regularity, which is peculiar to a region where the same wind brings almost always strata of air of the same temperature; and where the change of the Sun in it's declination causes * every year at the same period a rupture of equilibrium in the electric intensity, in the cessation of the breezes, and the commencement of the season of rains. The Oroonoko, the Rio Magdalena, and the Congo or Zaire, are the only great rivers of the equinoxial region of the globe, which, rising near the equator, have their mouths in a much higher latitude, though still within the tropics. The Nile and the Rio de la Plata direct their course in the two opposite hemispheres, from the torrid zone toward the temperate †.

* See the theory which I explained above, vol. iv, p. 409.

† In Asia, the Ganges, the Burampooter, and the majestic rivers of Indo-China, direct their course *toward the equator*. The former flow from the temperate to the torrid zone. This circumstance of courses pursuing opposite directions (*toward the equator, and toward the temperate climates*) has an influence on the period and the height of the risings, on the nature and variety of the productions on the banks of the rivers, on the

As long as, confounding the Rio Paragua of Esmeralda with the Rio Guaviare, the sources of the Oroonoko were sought toward the south-west, on the eastern back of the Andes, the risings of this river were attributed to a periodical melting of the snows. This reasoning was as far from the truth as that, in which the Nile was formerly supposed to be swelled by the waters of the snows of Abyssinia. The Cordilleras of New Grenada, near which the *western tributary streams of the Oroonoko* *, the Guaviare, the Meta, and the Apure, take their rise, enter no more into the limit of perpetual snows, with the sole exception of the *Paramos* of Chita and Mucuchies, than the Alps of Abyssinia. Snowy mountains are much more rare in the torrid zone †, than is generally admitted; and the melting of the snows, which is not copious there at any season, does not at all increase at the time of the inundations of the Oroonoko. The sources of this river are found (east of the Esmeralda) in the *mountains of Parima*, the highest summits of which do not exceed 1,200

less or greater activity of trade, and, I may add, from what we know of the nations of Egypt, Meroë, and India, on the progress of civilization along the valleys of the rivers.

* See above, p. 201, 215, and 319.

† See my *Nouvelles Recherches sur les Montagnes de l'Himalaya et la Hauteur des Neiges perpètuelles sous l'Equateur*, in the *Annales de Chimie et de Physique*, vol. xiv, p. 41.

or 1,300 toises in elevation; and from la Grita as far as Neiva (from 7·5° to 3° of latitude) the eastern branch of the Cordillera presents numerous *Paramos* from 1800 to 1900 toises high *; and only one group of *Nevados*, that is of mountains which surpass 2400 toises, in the five *Picachos of Chita*. The three great western tributary streams of the Oroonoko rise from the *Paramos de Cundinamarca*, which are destitute of snow. The secondary tributary streams only, which fall into the Meta and the Apure, receive some *àguas de nieve*, such as the Rio Casanare, which descends from the *Nevado de Chita*, and the Rio Santo Domingo †, which descends from the

* From north to south; the *Paramos* of Porqueras and of Laura (near la Grita); of Cacota; of Almorzadero, Zoraca, Guachaneque, and Chingasa (between Pamplona and Santa Fe de Bogota); la Suma Paz, between Pandi and Neiva. See my *Atlas Geogr.*, Pl. 17, 19, 21, 24. The mean temperature of the mountainous deserts, which the Spanish inhabitants of the equinoxial zone call *Paramos*, is 9°. I sometimes found the centigrade thermometer there at 4°. I saw no snow fall sporadically under the equator below 1860 or 1900 toises of absolute height. See the Memoir which I have just cited, p. 36.

† The Nevado de Mucuchies, the eastern part of the *Sierra Nevada de Merida*, gives rise on the south to the Rio de Santo Domingo; and on the north to the Rio Chama, which runs into the gulf of Maracaybo. A tributary stream of the first of these rivers, the Paguay, comes from the western part of the *Sierra Nevada de Merida*. There is therefore, in the whole circumference of the basin of the Oroonoko, no other

Sierra Nevada de Merida, and traverses the province of Varinas.

The cause of the periodical swellings of the Oroonoko acts equally on all the rivers, that take rise in the torrid zone. After the vernal equinox, the cessation of the breezes announces the season of rains. The increase of the rivers, which may be considered as natural *ombrometers*, is in proportion to the quantity of water, that falls in the different regions. This quantity, in the centre of the forests of the Upper Oroonoko and the Rio Negro, appeared to me to exceed 90 or 100 inches annually *. Such of the natives therefore, as have lived beneath the misty sky of the Esmeralda and the Atabapo, know, without the smallest notion of natural philosophy, what Eudoxus and Eratosthenes knew heretofore †, that the inundations of the great rivers are owing solely to the equatorial rains. The following is the usual progress of the oscillations of the Oroonoko. Immediately after the vernal equinox (the people say on the 25th of March), the commencement of the rising is perceived. It is at first only an inch in twenty-four hours;

summit that enters into the region of perpetual snows, but that *Sierra Nevada de Merida* (lat. 7° 50′), and the *Nevado de Chita* (lat. 5° 45′).

* See above, p. 248 and 326.

† *Strabo*, Lib. 17, p. 789. *Diod. Sic.*, Lib. 1, c. 5.

sometimes the river again sinks in April; it attains it's *maximum* in July; remains *full* (at the same level) from the end of July till the 25th of August; and then decreases progressively, but more slowly than it increased. It is at it's *minimum* in January and February. In both worlds the rivers of the northern torrid zone attain the greatest height nearly at the same period. The Ganges, the Niger, and the Gambia, reach the *maximum*, like the Oroonoko, in the month of August *. The Nile is two months later; either on account of some local circumstances in the climate of Abyssinia, or of the length of it's course, from the country of Berber, or 17·5° of latitude †, to the bifurcation

* Nearly forty or fifty days after the summer solstice.

† The point (17° 35′) where the Tacazze, or Astaboras, enters the Nile. (See the excellent work of Mr. *Burckhardt*, p. 163.) The Nile receives no river below this, either on the east or on the west; a solitary instance in the hydrographic history of the globe. The distance from the mouth of the Tacazze to the Delta is nearly 1350 nautical miles; so that admitting the mean velocity of the Nile (*Girard*, p. 13) to be four feet in a second, or two miles and a half in an hour, I find twenty-two days and a half for the time of the descent of a particle of water. This is also nearly the time a *swell* would take to descend from the sources of the Oroonoko to it's mouth, through an itinerary length of 1308 nautical miles. The velocity of the Nile in Nubia is no doubt a little greater, than I have estimated it in this calculation. The retardation of the oscillations of the Nile is very remarkable, compared

of the *Delta*. The Arabian geographers assert, that in Sennaar and in Abyssinia the Nile begins to swell in the month of April (nearly as the Oroonoko); the rise however does not become sensible at Cairo till toward the summer solstice; and the water attains it's greatest height at the end of the month of September *. The river keeps at the same level till the middle of October; and is at it's *minimum* in April and May, a period when the rivers of Guyana begin to swell anew. It may be seen from this rapid statement, that, notwithstanding the retardation caused by the form of the natural channels, and by local climatic circumstances, the great phenomenon of the oscillations of the rivers of the torrid zone is every where the same. In the two zodiacs vulgarly called *Tatar* and *Chaldean*, or Egyptian, (in the zodiac which contains the sign of the *Rat*, and in that which contains those of the *Fishes* and Aquarius,) particular constellations are consecrated to the periodical overflowings of the rivers. Real cycles, divisions of time, have been gradually transformed into divisions of space; but the generality of the physical phenomena of the risings seems to prove, that the zodiac which has been transmitted to us by the Greeks, and which, by the precession of

with those of other rivers of the tropics. Does this denote a more remote cause of the rising of the waters?

* Nearly eighty or ninety days after the summer solstice.

the equinoxes, becomes an historical monument of high antiquity, may have taken birth far from Thebes, and from the sacred valley of the Nile. In the zodiacs of the New World, in the Mexican for instance, of which we discover the vestiges in the signs of the days, and the periodical series which they compose, there are also signs *of rain and of inundation* corresponding to the *Chou* (Rat) of the Chinese * and Thibetan cycle of *Tse*, and to the *Fishes* and *Aquarius* of the dodecatemorion. These two Mexican signs are *Water (Atl)* and *Cipactli*, the sea monster furnished with a horn. This animal is at once the *Antelope-fish* of the Hindoos, the *Capricorn* of our zodiac, the Deucalion of the Greeks, and the Noah *(Coxcox)* of the Aztecks †. Thus we

* The figure of *water* itself is often substituted for that of the *Rat* (*Arvicola*) in the Tatar zodiac. The *Rat* takes the place of *Aquarius*. (Gaubil, *Obs. mathém.*, vol. iii, p. 33.)

† *Coxcox* bears also the denomination of *Teo-Cipactli*, in which the root *god* or *divine* is added to the name of the sign *Cipactli*. It is the man of the *fourth age;* who, at the fourth destruction of the world (the last renovation of nature), saved himself with his wife, and reached the mountain of Colhuacan. According to the commentator Germanicus, Deucalion was placed in Aquarius; but the three signs of the Fishes, Aquarius, and Capricorn (the antelope-fish), were heretofore intimately linked together. "The animal, which, after having long inhabited the waters, takes the form of an antelope, and climbs the mountains, reminds people, whose restless imagination seizes the most remote similitudes, of the ancient traditions of Menou, of Noah, and of those Deucalions ecle-

find the general results of *comparative hydrography* in the astrological monuments, the divisions of time, and the religious traditions of nations the most remote from each other in their situation, and in their degree of intellectual advancement.

As the equatorial rains take place in the flat country when the Sun passes through the zenith of the place, that is when it's declination becomes *homonymous* with the zone comprised between the equator and one of the tropics, the waters of the Amazon sink, while those of the Oroonoko rise perceptibly. In a very judicious discussion on the origin of the Rio Congo *, the attention of philosophers has been already called to the modifications, which the periods of the risings must undergo in the course of a river, the sources and the mouth of which are not on the same side of the equinoxial line †. The hydraulic systems

brated among the Scythians and the Thessalians." As the Tatarian and Mexican zodiacs contain the signs of the *Monkey* and the *Tiger*, they, no doubt, originated in the torrid zone. With the Muyscas, inhabitants of New Grenada, the first sign, as in eastern Asia, was that of *Water*, figured by a *frog*. It is also remarkable, that the astrological worship of the Muyscas came to the tableland of Bogota from the eastern side, from the plains of San Juan, which extend toward the Guaviare and the Oroonoko. See several hieroglyphic paintings in my Amer. Monuments.

* Voyage to the Zaire, p. xvii.

† Among the rivers of America this is the case with the Rio Negro, the Rio Branco, and the Jupura.

of the Oroonoko and the Amazon furnish a combination of circumstances still more extraordinary. They are united by the Rio Negro and the Cassiquiare, a branch of the Oroonoko; it is a navigable line, between two great basins of rivers, that is crossed by the equator. The river Amazon, according to the information which I obtained on it's banks, is much less regular in the periods of it's oscillations than the Oroonoko; it generally begins however to increase in December, and attains it's *maximum* of height in March *. It sinks from the month of May, and is at it's *minimum* of height in the months of July and August, at the time when the Lower Oroonoko inundates all the surrounding land. As no river of America can cross the equator from south to north, on account of the general configuration of the ground, the risings of the Oroonoko have an influence on the Amazon; but those of the Amazon do not alter the progress of the oscillations of the Oroonoko. It results from these data, that, in the two basins of the Amazon and the Oroonoko, the *concave* and *convex summits* of the curve of progressive increase and decrease † correspond very regularly with each other, since they exhibit the dif-

* Nearly seventy or eighty days after our winter solstice, which is the summer solstice of the southern hemisphere.

† *Girard*, fig. 1, where we find the curve of the rise of the

ference of six months, which results from the situation of the rivers in opposite hemispheres. The commencement of the risings only is less tardy in the Oroonoko. This river increases sensibly as soon as the Sun has crossed the equator; in the Amazon, on the contrary, the risings do not commence till two months after the equinox. It is known, that in the forests north of the line the rains are earlier, than in the less woody plains of the southern torrid zone. To this local cause is joined another, which acts perhaps equally on the tardy swellings of the Nile. The river Amazon receives a great part of it's waters from the Cordillera of the Andes, where the seasons, as every where among mountains, follow a peculiar type, most frequently opposite to that of the low regions.

The law of the increase and decrease of the Oroonoko is more difficult to determine with

Nile. The following are the analogous results for two great rivers of South America compared with the Nile.

OROONOKO. (Lat. 3° to 8° N.)	AMAZON. (Lat. 3° N. to 16° S.)	NILE. (Lat. 11° 30′ to 31° 15′ N.)
Beginning of the rise ... April.	December.	April (Abyssinia); June (Cairo).
Maximum ... Aug.	March.	September.
Minimum Jan. Feb.	July, August.	April.

The Oroonoko, like the Nile, increases during 100 or 115 days. The *maximum* of the Rio del Norte is in May. (Pol. Essay, vol. i, p. 303.)

respect to space, or to the magnitude of the oscillations, than with regard to time, or the period of the *maxima* and *minima*. Having been able to measure but imperfectly the risings of the river, I report, not without hesitation, estimates, that differ much from each other*. Foreign pilots admit ninety feet for the ordinary rise in the Lower Oroonoko. Mr. de Pons, who has in general collected very accurate notions during his stay at Caraccas, fixes it at thirteen fathoms. The heights naturally vary according to the breadth of the bed, and the number of tributary streams which the principal trunk receives. The swellings of the Nile in Upper Egypt are from thirty to thirty-five feet; at Cairo twenty-three feet; and in the northern part of the *Delta* four feet. It appears, that the *mean* rise at Angostura does not exceed twenty-four or twenty-five feet. In this spot an island, situate in the middle of the river, would furnish the same facility for measuring the increase, as that afforded by the nilometer (*Megyas*) placed at

* *Tuckey, Maritime Geogr.*, vol. iv, p. 309. *Hippisley, Exped. to the Oroonoko*, p. 38. *Gumilla*, vol. i, p. 56—59. *Depons*, vol. iii, p. 301. The greatest height of the rise of the Missisippi is, at Natchez, fifty-five English feet. This river (the largest perhaps of the whole temperate zone) is at it's *maximum* from February to May; at it's *minimum* in August and September. *Ellicot*, Journal of an Expedition to the Ohio, p. 120.

the point of the island of Roudah. An eminent scientific gentleman, who has recently resided on the banks of the Oroonoko, Mr. Zea, will supply what is wanting in my observations on a point so important. The people believe, that every twenty-five years the Oroonoko rises three feet higher than common; but the idea of this cycle does not rest on any precise measures. We know by the testimony of antiquity, that the oscillations of the Nile have been sensibly the same with respect to their height and duration for thousands of years; which is a proof well worthy of attention, that the mean state of the humidity and the temperature does not vary in that vast basin. Will this constancy in physical phenomena, this equilibrium of the elements, be preserved in the New World also after some ages of cultivation? I think we may reply in the affirmative; for the united efforts of man cannot have an influence on the general causes, on which the climate of Guyana depends.

According to the barometric height of San Fernando de Apure, I find from that town to the *Boca de Navios* the slope of the Apure and the Lower Oroonoko to be three inches and a quarter to a nautical mile of nine hundred and fifty toises *. We may be surprised at the strength

* The Apure itself has a slope of thirteen inches to the mile. See vol. iv, p. 455.

of the current in a slope so little perceptible; but I shall remind the reader on this occasion, that, according to measurements made by order of Mr. Hastings, the Ganges was found in a course of sixty miles (comprising the windings) to have also only four inches fall to a mile; and that the mean swiftness of this river is in the seasons of drought three miles an hour, and in those of rains six or eight miles. The strength of the current therefore, in the Ganges as in the Oroonoko, depends less on the slope of the bed, than on the accumulation of the higher waters, caused by the abundance of the rains, and the number of tributary streams *. European colonists have already been settled for two hundred and fifty years on the banks of the Oroonoko; and during this long period of time, according to a tradition which has been propagated from generation to generation, the periodical oscillations of the river (the time of the beginning of the rising, and that when it attains it's *maximum*) have never been retarded more than twelve or fifteen days.

When vessels that draw a good deal of water sail up toward Angostura in the months of January and February, by favour of the seabreeze and the tide, they run the risk of taking the ground. The navigable channel often changes it's breadth

* Barrow, in the *Voyage to the Zaire*, Intr., p. xvii.

and direction; no buoy however has yet been laid down, to indicate any deposit of earth formed in the bed of the river, where the waters have lost their original velocity. There exists on the south of Cape Barima, as well by the river of this name as by the Rio Moroca and several *esteres**, a communication with the English colony of Essequebo. Small vessels can penetrate into the interior as far as the Rio Poumaron †, on which are the ancient settlements of Zealand and Middlebourg. Heretofore this communication interested the government of Caraccas only on account of the facility it furnished to an illicit trade; but since Berbice, Demerara, and Essequebo, have fallen into the hands of a more powerful neighbour, it fixes the attention of the Spanish Americans as being connected with the security of their frontiers. Rivers which have a course parallel to the coast, and are no where farther distant from it than five or six nautical miles ‡, characterize the

* *Aestuaria*, estuaries.

† Near Cape Nassau. Colonel Ynciarte, before he was settled at Angostura, was employed by the Spanish government to make a survey of the labyrinth of channels *(esteros y caños)* between the great mouth of the Oroonoko and that of the Essequebo. Unfortunately this officer was not furnished with a chronometer.

‡ See for instance, on Mr. Van der Bosch's fine maps, the course of the Commewyne, which joins the river of Surinam at right angles, as the Cayuni joins the Essequebo.

whole of the shore between the Oroonoko and the Amazon.

Ten leagues distant from Cape Barima, the great bed of the Oroonoko is divided for the first time into two branches of two thousand toises in breadth. They are known by the Indian names of Zacupana and Imataca. The first, which is the northernmost, communicates on the west of the islands Congrejos and del Burro with the *bocas chicas* of Lauran *, Nuina, and Mariusas. As the Isla del Burro disappears in the time of great inundations, it is unhappily not suited to fortifications. The southern bank of the *brazo* Imataca is cut by a labyrinth of little channels, into which the Rio Imataca and the Rio Aquire † flow. A long series of little granitic hills rises in the fertile savannahs between the Imataca and the Cuyuni; it is a prolongation of the Cordilleras of Parima, which, bounding the horizon south of Angostura, forms the celebrated cataracts of the Rio Caroni, and approaches the Oroonoko like a projecting cape near the little fort of *Vieja Guyana*. The populous missions of the Caribbee and Guyana Indians, governed by the Catalonian Capuchins, lie near the sources of the Imataca and the Aquire. The easternmost of these missions are those of Mi-

* *Canno francès.*

† These channels communicate with the Canno de Arcciſes, which opens two leagues west of cape Barima.

amu, Cumamu, and Palmar, situate in a hilly country, which extends toward Tupuquen, Santa Maria, and the Villa de Upata. Going up the Rio Aquire, and directing your course across the pastures toward the south, you reach the mission of Belem de Tumeremo, and thence the confluence of the Curumu with the Rio Cuyuni, where the Spanish post or *destacamento de Cuyuni* * was formerly established. I enter into this topographic detail, because the Rio Cuyuni, or Cuduvini, runs parallel to the Oroonoko from west to east, through an extent of 2·5° or 3° of longitude †, and furnishes an excellent natural boundary between the territory of Caraccas and that of English Guyana.

The two great branches of the Oroonoko, the Zacupana and the Imataca, remain separate for fourteen leagues; on going up farther, the waters of the river are found united ‡ in a single channel extremely broad. This channel is near eight leagues long; at it's western extremity a second bifurcation appears; and as the summit of the

* On the east of the mountains of Kinoroto.

† Including the Rio Juruam, one of the principal branches of the Cuyuni. The Dutch military post is five leagues west of the union of the Cuyuni with the Essequebo, where the former of these rivers receives the Mazuruni.

‡ At this point of Union are found two villages of Guaraons. They also bear the names of Imataca and Zacupana. See vol. iii, p. 279.

delta is in the northern branch of the *bifurcated* river, this part of the Oroonoko is highly important for the military defence of the country. All the channels*, that terminate in the *bocas chicas*, rise from the same point of the trunk of the Oroonoko. The branch (*Cano Manamo*) that separates from it near the village of San Rafael has no ramification till after a course of three or four leagues; and by placing a small fort above the island of Chaguanes, Angostura might be defended against an enemy, that should attempt to penetrate by one of the *bocas chicas*. In my time the station of the gunboats was east of San Rafael, near the northern bank of the Oroonoko. This is the point †, which vessels must pass in sailing up toward Angostura by the northern channel, that of San Rafael, which is the broadest but the most shallow.

Six leagues above the point where the Oroonoko sends off a branch to the *bocas chicas*, is

* *Canno de Manamo grande, C. de Manamo chico, C. Pedernales, C. Macareo, C. Cutupiti, C. Macuona, C. grande de Mariusas,* &c. The last three branches form by their union the sinuous channel called the *Vuelta del Torno*. Though the labyrinth of these small branches appears to be subject to frequent changes, it is not less certain, that an accurate plan might be taken of the great branches of the *Delta* of the Oroonoko. This labour would no doubt be long; but by rectifying from time to time the *soundings marked on it*, it would become a great help to the navigation.

† *Barancas*, near the island of Yaya.

placed an ancient fort *(los Castillos de la Vieja* or *Antigua Guayana)* ,the first construction of which goes back to the sixteenth century. In this spot the bed of the river is studded with rocky islands *; and it is asserted, that it's breadth is nearly six hundred and fifty toises. The town is almost destroyed, but the fortifications † subsist, and are well worthy the attention of the government of Terra Firma. There is a magnificent view from the battery established on a bluff north-west of the ancient town, which at the period of great inundations is entirely surrounded with water. Pools that communicate with the Oroonoko form natural *basins*, adapted for the reception of vessels that want repairs. It is to be hoped, that, when peace is restored to those countries, and a narrow policy no longer checks the course of industry, those basins of Vieja Guayana will be surrounded with yards for building vessels. Next to the Amazon, there is no river, which, from the forests through which it flows, can furnish more valuable timber for ship-building. This timber, drawn from the great families of the laurineæ, guttiferæ, rutaceæ, and arborescent legumina, affords all the desir-

* West of the *Islas Iguanas.*

† *Los fuertes de San Francisco de Asis y del Padrasto.* I know not whether the remains of the *Castillo de San Fernando*, or of *Limones*, still exist opposite *Vieja Guayana*, on the northern bank.

able varieties of density, specific gravity, and more or less resinous qualities. All that is wanting in this country is a wood fit for masts, light, elastic, and with parallel fibres, such as is furnished by the coniferæ of the temperate regions, and of the lofty mountains of the tropics.

After having passed the little forts of *Vieja Guayana*, the bed of the Oroonoko again widens. The state of cultivation of the country on the two banks affords a striking contrast. On the north is seen the desert part of the province of Cumana, steppes *(Llanos)* destitute of habitations, and extending beyond the sources of the Rio Mamo, toward the tableland or *mesa* of Guanipa. On the south we find three populous villages belonging to the missions of Carony, namely, San Miguel de Uriala *, San Felix, and San Joaquin. The last of these villages, situate on the banks of the Carony immediately below the great cataract, is considered as the *embarcadero* of the *Catalonian missions*. On navigating more to the east, between the mouth of the Carony and Angostura, the pilot should avoid the rocks of Guarampo, the sandbank of Mamo, and the Piedra del Rosario. From the numerous materials which I brought home, and from astronomical discussions, the principal results of which I have indicated above, I have constructed a map of the

* See above, p. 709.

country bounded by the *delta* of the Oroonoko, the Carony, and the Cuyuni. This part of Guyana, from it's proximity to the coasts, will some day offer the greatest attraction to European settlers.

The whole population of this vast province in it's present state is, with the exception of a few Spanish parishes *, scattered on the banks of the Lower Oroonoko, and subject to two monastic governments. Estimating the number of the inhabitants of Guyana, who do not live in savage independance, at thirty-five thousand, we find nearly twenty-four thousand settled in the missions, and thus withdrawn as it were from the direct influence of the secular arm. At the period of my voyage, the territory of the monks of the Observance of St. Francis contained seven thousand three hundred inhabitants, and that of the *Capuchinos Catalanes* seventeen thousand; an astonishing disproportion, when we reflect on the smallness of the latter territory compared to the vast banks of the Upper Oroonoko, the Atabapo, the Cassiquiare, and the Rio Negro. It results from these statements, that nearly two thirds of the population of a province of sixteen thousand eight hundred square leagues are found concentred between the Rio Imataca and the town of Santo Thomè del Angostura, on a space of ground only fifty-

* *Pueblos y villas de Espanoles.*

five leagues in length, and thirty in breadth. Both of these monastic governments are equally inaccessible to Whites, and form *status in statu*. The first, that of the Observantins, I have described from my own observations; it remains for me to record here the notions I could procure respecting the second of these governments, that of the Catalonian Capuchins. Fatal civil dissensions, and epidemic fevers, have of late years diminished the long increasing prosperity of the missions of the Carony; but, notwithstanding these losses, the region which we are going to examine is still highly interesting with respect to political economy.

The missions of the Catalonian Capuchins, which in 1804 contained at least sixty thousand head of cattle grazing in the savannahs, extend from the eastern banks of the Carony and the Paragua as far as the banks of the Imataca, the Curumu, and the Cuyuni; at the south-east they border on English Guyana, or the colony of Essequebo; and toward the south, in going up the desert banks of the Paragua and the Paraguamasi, and crossing the Cordillera of Pacaraimo, they touch the Portugueze settlements on the Rio Branco. The whole of this country is open, full of fine savannahs, and no way resembling that through which we passed on the Upper Oroonoko. The forests become impenetrable only on advancing

toward the south; on the north are meadows intersected with woody hills. The most picturesque scenes lie near the falls of the Carony, and in that chain of mountains, two hundred and fifty toises high, which separates the tributary streams of the Oroonoko from those of the Cuyuni. There are situate the *Villa de Upata**, the capital of the missions, Santa Maria, and Cupapui. Small tablelands afford a healthy and temperate climate. Cacao, rice, cotton, indigo, and sugar, grow in abundance, wherever a virgin soil, covered with a thick coat of grasses, is subjected to cultivation. The first Christian settlements in those countries are not, I believe, of an earlier date than 1721. The elements of which the present population is composed are the three Indian races of the Guayanoes, the Caribbees, and the Guaycas. The last are a people of mountaineers, and are far from being so diminutive in size as the Guaycas whom we found at Esmeralda†. It is difficult to fix them

* Founded in 1762. Population; 657 souls in 1797; 769 souls in 1803. The most populous villages of these missions, Alta Gracia, Cupapui, Santa Rosa de Cura, and Guri, had between 600 and 900 inhabitants, in 1797; but in 1818 epidemic fevers diminished the population more than a third. In some missions these diseases have swept away nearly half of the inhabitants. *See* Trip from Angostura to the Capuchin Missions of the Caroni, in the *Jour. of the Royal Instit.*, 1820, No. 16, p. 260—287, and No. 17, p. 1-132.

† See above, p. 565.

to the soil; and the three most modern missions in which they have been collected, those of Cura, Curucuy, and Arechica, are already destroyed. The Guayanoes, who early in the sixteenth century gave their name to the whole of that vast province, are less intelligent, but milder, and more easy, if not to civilize, at least to subjugate, than the Caribbees. Their language appears to belong to the great branch of the Caribbee and Tamanac tongues. It displays the same analogies of roots and grammatical forms, which is observed between the Sanskrit, the Persian, the Greek, and the German. It is not easy to fix the forms of what is indefinite by it's nature; and to agree on the differences, which should be admitted between dialects, derivative languages, and mother tongues. The Jesuits of Paraguay have made known to us another tribe of Guayanoes* in the southern hemisphere, living in the thick forests of Parana. Though it cannot be denied in general, that, in consequence of distant migrations†, the nations that are settled north and south of the Amazon have had communications with each other, I will not decide, whether the *Guayanoes* of Parana and of Uraguay exhibit any other relation

* They are also called *Guananas*, or *Gualachas*. (See *Azara, Voyage to Paraguay*, vol. ii, p. 221.)

† Like the celebrated migrations of the *Om-aguas*, or *Omeguas*.

to those of Carony, than that of an homonomy, which is perhaps only accidental*.

The most considerable Christian settlements are now concentred between the mountains of Santa Maria, the mission of San Miguel, and the eastern bank of the Carony, from San Buenaventura as far as Guri† and the *embarcadero* of San Joaquin; a space of ground which has not more than four hundred and sixty square leagues of surface. The savannahs to the east and the south are almost uninhabited; we find there only the solitary missions of Belem, Tumuremo, Tupuquen, Puedpa, and Santa Clara. It were to be wished, that the spots preferred for cultivation were distant from the rivers, where the land is higher, and the air more favorable to health. The Rio Carony, the waters of which, of an admirable clearness, are not well stocked with fish, is free from shoals from the Villa de Barceloneta, a little above the confluence of the Paragua, as far as the village of Guri. Farther north it winds between innumerable islands and rocks; and the small boats of the Caribbees

* Beside the Caribbees, the Guayanoes, and the Guaycas, there are also, in the missions of Carony, Pariagotoes, Guaraunoes, and Aruacas. See on these different races, vol. iii, p. 275 and 287.

† *Euri*, in the map inserted in the Journal of the Royal Institution, No. 17. The village of Rosario de *Guacipati* is called in that map *Wasipati*.

only venture to navigate amid these *raudales*, or rapids of the Carony. Happily the river is often divided into several branches; and consequently that can be chosen, which according to the height of the waters presents the fewest whirlpools and shoals. The great *Salto*, celebrated for the picturesque beauty of it's situation, is a little above the village of Aguacaqua, or Carony, which in my time had a population of seven hundred Indians. This cascade is said to be from fifteen to twenty feet high; but the bar does not cross the whole bed of the river, which is more than three hundred feet broad. When the population is more extended toward the east, it will avail itself of the course of the small rivers Imataca and Aquire, the navigation of which is pretty free from danger. The monks, who like to keep themselves isolated, in order to withdraw from the eye of the secular power, have been hitherto unwilling to settle on the banks of the Oroonoko. It is however by this river only, or by the Cuyuni and the Essequebo, that the missions of Carony can export their productions. The latter way has not yet been tried, though several Christian settlements* are formed

* Guacipati, Tupuquen, Angel de la Custodia, and Cura, where the military post of the frontiers was stationed in 1800, which had been anciently placed at the confluence of the Cuyuni and the Curumu.

on one of the principal tributary streams of the Cuyuni, the Rio Juruario*. This stream furnishes at the period of the great swellings the remarkable phenomenon of a bifurcation. It communicates by the Juraricuima and the Aurapa with the Rio Carony†; so that the land comprised between the Oroonoko, the sea, the Cuyuni, and the Carony, becomes a real island. Formidable rapids impede the navigation of the Upper Cuyuni; and hence of late an attempt has been made, to open a road to the colony of Essequebo much more to the south-east, in order to fall in with the Cuyuni much below the mouth of the Curumu.

The whole of this southern territory is traversed by hordes of independant Caribbees; the feeble remains of that warlike people, who were so formidable to the missionaries till 1733 and 1735, at which period the respectable bishop Gervais de Labrid‡, canon of the metropolitan chapter of Lyon, father Lopez, and several other ecclesiastics, perished by the hands of the Caribbees. These dangers, too frequent formerly,

* Rio Yuarnare of the English map which I have just quoted.

† *Caulin*, p. 57 and 61.

‡ Consecrated a bishop for the four parts of the world (*obispo para las quatro partes del mundo*) by pope Benedict the 13th.

exist no longer, either in the missions of Carony, or in those of the Oroonoko; but the independant Caribbees continue, on account of their connection with the Dutch colonists of Essequebo, an object of mistrust and hatred to the government of Guyana. These tribes favor the contraband trade along the coast, and by the channels or estuaries, that join the Rio Barima to the Rio Moroca; they carry off the cattle belonging to the missionaries, and excite the Indians recently converted, and living *within the sound of the bell,* to return to the forests. The free hordes have every where a powerful interest in opposing the progress of cultivation, and the encroachments of the *Whites.* The Caribbees and the Aruacas procure firearms at Essequebo and Demerara; and, when the traffic of American slaves *(poitos)* was most active, adventurers of Dutch origin took part in these incursions on the Paragua, the Erevato, and the Ventuario. *Men-hunting* took place on these banks, as heretofore (and probably still) on those of the Senegal and the Gambia. In both worlds Europeans have employed the same artifices, and committed the same atrocities, to maintain a trade that dishonours humanity. The missionaries of the Carony and the Oroonoko attribute all the evils they suffer from the independent Caribbees to the hatred of their neighbours, the Calvinist preachers of Essequ-

bo. Their works are therefore filled with complaints* of the *secta diabolica de Calvino y de Lutero*, and against the heretics of Dutch Guyana, who also think fit sometimes to go on missions, and spread the germe of social life among the savages.

Of all the vegetable productions of those countries, that which the industry of the Catalonian Capuchins has rendered the most celebrated is the tree, that furnishes the *cortex Angosturæ*, which is erroneously designated by the name of cinchona of Carony. We were fortunate enough to make it first known as a new genus distinct from the cinchona, and belonging to the family of meliaceæ, or of zanthoxylus†. This

* *Caulin*, p. 373. *Gumilla*, vol, i, p. 20. *Fray Pedro Simon*, p. 211. *Lettres édif.*, vol. xvi, No. 20.

† See our *Equin. Plants*, vol. i, p. 61, pl. 39. Willdenow, in the *Mémoires de l' Académie de Berlin*, 1802, p. 24. De Candolle, *Propriétés des Plantes*, p. 93. Richard, in the *Mém de l' Institut*, 1811, P. i, p. 82, Pl. 10. Beside the ticorea of Aublet, there is reason to believe a second species of the genus bonplandia, the real bonplandia trifoliata, also grows in French Guyana. Mr. Kunth recognized it among the plants of Cayenne sent home by Mr. Martin. At Guayaquil I had inscribed the bonplandia in my *Table of the Geography of Plants*, under the provisional name of *cusparia febrifuga*; this name, which has by mistake remained on the plate published after my return to Europe, has been copied into many works on the materia medica. The bonplandia of Cavanilles is a Mexican plant, to which we have given the name of caldasia geminiflora, and which is become common in our gardens. (*Willd.*,

salutary drug of South America was formerly attributed to the brucea ferruginea, which grows in Abyssinia, to the magnolia glauca, and to the magnolia plumieri. During the dangerous disease of Mr. Bonpland, Mr. Ravago sent a confidential person to the missions of Carony, to procure for us, by favor of the Capuchins of Upata, branches of the tree in flower, which we wished to be able to describe. We obtained very fine specimens, the leaves of which, eighteen inches long, diffused an agreeable aromatic smell. We soon perceived, that the *cusparc* (the indigenous name of the *cascarilla* or *corteza del Angostura)* forms a new genus; and on sending the plants of the Oroonoko to Mr. Willdenow, I begged he would dedicate this plant to Mr. Bonpland. The tree, known at present by the name of bonplandia trifoliata, grows at the distance of five or six leagues from the eastern bank of the Carony, at the foot of the hills that surround the missions Capapui, Upata, and Alta Gracia. The Caribbee Indians make use

Hortus Berol., vol. i, p. 71.) The abbé Cavanilles, in dedicating this genus of the family of the polemoniaceous plants to Mr. Bonpland, had no knowledge of the memoir on the *cortex Angosturæ*, which Mr. Willdenow had presented to the Academy of Berlin. The term *angostura* as a generic name is altogether inadmissible. Would a plant be named *roma*, which, without growing in the vicinity of that city, had become an article of trade among the Romans?

of an infusion of the bark of the *cuspare*, which they consider as a strengthening remedy. Mr. Bonpland discovered the same tree west of Cumana, in the gulf of Santa Fe, where it may become one of the articles of exportation from New Andalusia.

The Catalonian monks prepare an extract of the cortex angosturæ, which they send to the convents of their province, and which deserves to be better known in the north of Europe. It is to be hoped, that the febrifuge and antidysenteric bark of the bonplandia will continue to be employed, notwithstanding the introduction of another described by the name of *false Angostura bark*, and often confounded with the former. This *false Angostura*, or *Angostura pseudo-ferruginea*, comes, it is said, from the brucea antidysenterica; it acts powerfully on the nerves *, produces violent attacks of tetanos, and contains, according to the experiments of Pelletier and Caventon, a peculiar alkaline substance † analogous to morphin and strychnin.

* According to the experiments of Emmert, Marc, and Orfila.

† *La brucine.* Mr. Pelletier has wisely avoided using the word *angosturine*, because it might indicate a substance taken from the real *cortex angosturæ*, or *bonplandia trifoliata*. (*Annales de Chimie*, vol. xii, p. 117.) We saw at Peru the barks of two new species of weinmannia and wintera mixed with those of cinchona; a mixture less dangerous, but still inju-

As the tree which yields the real *cortex Angosturæ* does not grow in great abundance, it is to be wished, that plantations of it were formed. The Catalonian monks are well fitted to spread this kind of cultivation; they are more economical, industrious, and active, than the other missionaries. They have already established tanyards and cotton spinning in a few villages*; and if they suffer the Indians henceforth to enjoy the fruit of their labors, they will find great resources in the native population. Concentred on a small space of land, these monks have the consciousness of their political importance, and have from time to time resisted the civil authority, and that of their bishop. The governors who reside at Angostura have struggled against them with very unequal success, according as the ministry of Madrid showed a complaisant deference for the ecclesiastical hierarchy, or sought to limit it's power. In 1768 don Manuel Centurion carried off twenty thousand head of cattle from the missionaries, in order to distribute them among the indigent inhabitants. This liberality, exerted in a manner not very legal, produced very serious consequences. The governor was disgraced on the complaint of the Catalonian monks, though he had considerably extended

rious, on account of the superabundance of tannin and acrid matter contained in the false *cascarillas*.

* At Miamo, Tumeremo, &c.

the territory of the missions toward the south, and founded the *villa* de Barceloneta, above the confluence of the Carony with the Rio Paragua, and the *Ciudad* de Guirior, near the union of the Rio Paragua and the Paraguamusi. From that period till the political troubles, which now agitate the Spanish colonies, the civil administration has carefully avoided all intervention in the affairs of the Capuchins; whose opulence has been exaggerated, like that of the Jesuits of Paraguay.

The missions of the Carony, by the configuration of their soil * and the mixture of savannahs and arable lands, unite the advantages of the Llanos of Calabozo and the vallies of Aragua. The real wealth of this country is founded on the care of the herds, and the cultivation of colonial produce. It were to be wished, that here, as in the fine and fertile province of Venezuela, the inhabitants, faithful to the labours of the fields, would not addict themselves too hastily to the research of mines. The example of Germany and Mexico prove no doubt, that the working of metals is not at all incompatible with a flourishing state of agriculture; but, according to popular traditions, the banks of the Carony lead to the lake Dorado, and the

* It appears, that the little table-lands between the mountains of Upata, Cumamu, and Tupuquen, are more than one hundred and fifty toises above the level of the sea.

palace of the *gilded man**; and this lake, and this palace, being a *local fable*, it might be dangerous to awaken remembrances, which begin gradually to be effaced. I was assured, that in 1760 the independent Caribbees went to *Cerro de Pajarcima*, a mountain to the south of *Vieja Guayana*, to submit the decomposed rock to the action of washing. The gold dust collected by this labour was put into calebashes of *crescentia cujete*, and sold to the Dutch at Essequebo. Still more recently, some Mexican miners, who abused the credulity of Don Jose Avalo† the intendant of Caraccas, undertook a very considerable work in the centre of the missions of the Rio Carony, near the town of Upata, in the *Cerros del Potrero* and *de Chirica*. They declared, that the whole rock was auriferous; stamping-mills, *brocards*, and smelting furnaces were constructed. After having expended very large sums, it was discovered, that the pyrites contained no trace whatever of gold. These essays, though fruitless, served to renew the ancient idea‡, "that every shining rock in Guyana is *una madre del oro*." Not contented with taking the mica-slate to the furnace, strata

* *El Dorado*, that is, *el rey o' hombre dorado*. See above, p. 390.

† See above, vol. iii, p. 531.

‡ *Raleigh*, Discovery of the Empire of Guiana, p. 2 and 34.

of *amphibolic slates* were shown to me near Angostura, without any mixture of heterogeneous substances, which had been worked under the whimsical name of black ore of gold, *oro negro*.

This is the place to make known, in order to complete the description of the Oroonoko, the principal results of my researches on *el Dorado*, the White Sea, or Laguna Parime, and the sources of the Oroonoko, as they are marked in the most recent maps. The idea of an auriferous earth, eminently rich, has been connected, ever since the end of the 16th century, with that of a great inland lake, which furnishes at the same time waters to the Oroonoko, the Rio Branco, and the Rio Essequebo. I believe, from a more accurate knowledge of the country, a long and laborious study of the Spanish authors who treat of *el Dorado*, and above all from comparing a great number of ancient maps arranged in chronological order, I have succeeded in discovering the source of these errors. All fables have some real foundation; that of *Dorado* resembles those *mythoi* of antiquity, which, travelling from country to country, have been successively adapted to different localities. In the sciences, in order to distinguish truth from error, it often suffices to retrace the history of opinions, and to follow their successive developments. The discussion to which I shall devote the end of this chapter is important, not only because it

throws light on the events of the *conquest*, and that long series of disastrous expeditions made in search of *Dorado*, the last of which (I am ashamed to say) was in the year 1775; it also furnishes, in addition to this simply historical interest, another more substantial, and more generally felt, that of rectifying the geography of South America, and of disembarrassing the maps published in our days of those great lakes, and that strange labyrinth of rivers, placed as if by chance between sixty and sixty-six degrees of longitude. No man in Europe believes any longer in the wealth of Guyana, and the empire of the *grand Patiti*. The town of Manoa, and it's palaces covered with plates of massy gold, have long since disappeared; but the geographical apparatus serving to adorn the fable of *Dorado*, the lake Parima, which, similar to the lake of Mexico, reflected the image of so many sumptuous edifices, has been religiously preserved by geographers. In the space of three centuries the same traditions have been differently modified; from ignorance of the American languages, rivers have been taken for lakes, and *portages* for branches of rivers; one lake, the *Cassipa*, has been made to advance five degrees of latitude toward the south, while another, the *Parima* or *Dorado*, has been transported the distance of a hundred leagues, from the western to the eastern bank of the Rio

Branco. From these various changes, the problem we are going to solve has become much more complicated, than is generally supposed. The number of geographers, who discuss the basis of a map, with regard to the three points of measures, of the comparison of descriptive works, and of the etymological study* of names,

* I use this expression, perhaps an improper one, to mark a species of *philological* examination, to which the names of rivers, lakes, mountains, and tribes, must be subjected, in order to discover their identity in a great number of maps. The apparent diversity of names arises partly from the difference of the dialects spoken by one and the same family of people, partly from the imperfection of our European orthography, and from the extreme negligence with which geographers copy one another. We recognize with difficulty the Rio Uaupe in the Guapue or Guape; the Xië, in the Guaicia; the Raudal d'Atures, in Athule; the Caribbees, in the Calinas and Galibis; the Guaraunoes, or Uarau, in the Waraw-ites; &c. It is however by similar mutations of letters, that the Spaniards have made *hijo* of filius; *hambre*, of fames; and Felipo de *Urre*, and even *Utre*, of the *Conquistador* Philip von Hutten; that the Tamanacs in America have substituted *choraro* for *soldado;* and the Jews in China, *Ialemeiohang* for Jeremiah. (See above, vol. iii, p. 254—257, 276, 277, 280; and vol. iv, p. 340 and 478.) Analogy and a certain etymological tact must guide geographers in researches of this kind, in which they would be exposed to serious errors, if they were not to study at the same time the respective situations of the upper and lower tributary streams of the same river. Our maps of America are overloaded with names, for which rivers have been created; as, in the catalogues of organic beings called *Systema Naturæ*, a plant,

is extremely small. Almost all the maps of South America, which have appeared since the year 1775, are, in what regards the interior of the country comprised between the steppes of Venezuela and the river of the Amazons, between the eastern back of the Andes and the

or an animal, which has been described under different names, is indicated as two or three distinct species. This desire of compiling, of filling up vacancies, and of employing without investigation heterogeneous materials, has given our maps of countries the least visited an appearance of exactness, the falsity of which is discovered, when we arrive on the spot. Mr. de la Condamine has made the same observation; "the maps of Guyana," says he, "swarm with details as false as they are circumstantial." (*Voyage à l'Amazon*, p. 189.) While I indicate in the text the three principal foundations of geographical labours, I carefully distinguish the discussion of *measures* (that is, astronomical observations, and geodesic and itinerary operations) from the study which is necessary of voyages, of the descriptions of provinces, and of ancient and modern maps. If every country were trigonometrically surveyed, the construction of maps would be reduced to a mechanical operation. The sagacity of the geographer is exerted on what is doubtful; and in our days sound criticism must be necessarily founded on two distinct branches of knowledge, on the discussion of the relative value of the astronomical methods employed, and on the study of descriptive works (travels, statistical tracts, and histories of conquests) in the languages in which their authors have written. This study of the originals is so much the more indispensable, because in most descriptive works (as D'Anville has already judiciously observed) the maps annexed are in many points in direct contradiction with the text.

coast of Cayenne, a simple copy of the great Spanish map of La Cruz Olmedilla. A line, indicating the extent of country which Don Jose Solano boasted of having discovered and pacified by his troops and emissaries, was taken for the road followed by that officer, who never went beyond San Fernando de Atabapo, a village one hundred and sixty leagues distant from the pretended lake Parima. The study of the work of father Caulin, who was the historiographer of the expedition of Solano, and who states very clearly, from the testimony of the Indians, " how the name of the river Parima gave rise to the fable of Dorado, and of an inland sea," has been neglected. No use either has been made of a map of the Oroonoko, *three years posterior* to that of La Cruz, and traced by Surville from the collection of true or hypothetical materials preserved in the archives of the *Despacho universal de Indias*. The progress of geography, as manifested on our maps, is much slower than might be supposed from the number of useful results, which are found scattered in the works of different nations. Astronomical observations and topographic information accumulate during a long lapse of years, without being made use of; and from a principle of stability and preservation, in other respects praiseworthy, those who construct maps often choose rather to add nothing, than to sacrifice a lake, a chain of moun-

tains, or an interbranching of rivers, which have figured there during ages.

The fabulous traditions of Dorado and the lake Parima having been diversely modified according to the aspect of the countries to which they were to be adapted, we must distinguish what they contain that is real from what is merely imaginary. To avoid entering here into minute particulars, which will find a more proper place in the *Analysis* of the *Geographical Atlas*, I shall begin first to call the attention of the reader to those spots, which have been at various periods the theatre of the expeditions undertaken for the discovery of *Dorado*. When we have learnt to know the aspect of the country, and the local circumstances, such as they can now be described, it will be easy to conceive, how the different hypotheses recorded on our maps have taken rise by degrees, and have modified each other. To oppose an error, it is sufficient to recall to mind the variable forms, in which we have seen it appear at different periods.

Till the middle of the 18th century, all the vast space of land comprised between the mountains of French Guyana and the forests of the Upper Oroonoko, between the sources of the Carony and the river of Amazons (from 0° to 4° of north latitude, and from 57° to 68° of longitude), was so little known, that geographers could place in it lakes where they pleased, create

communications between rivers, and figure chains of mountains more or less lofty. They have made full use of this liberty; and the situation of lakes, as well as the course and branchings of rivers, has been varied in so many ways, that it would not be surprising, if among the great number of maps some were found, that trace the real state of things. The field of hypotheses is now singularly narrowed. I have determined the longitude of Esmeralda in the Upper Oroonoko; more to the east, amid the plains of Parima (a land as unknown as Wangara and Dar-Saley in Africa), a band of twenty leagues broad has been travelled over from north to south, along the banks of the Rio Carony and the Rio Branco, in the longitude of sixty-three degrees. This is the perilous road, which was taken by don Antonio Santos in going from Santo Thomé del Angostura to Rio Negro and the Amazon; by this road also the colonists of Surinam communicated very recently with the inhabitants of Grand Para*. This road divides the *terra incognita* of Parima into two unequal portions; and fixes limits at the same time to the sources of the Oroonoko, which it is no longer possible to carry back indefinitely toward the east, without supposing that the bed of the Rio Branco, which flows from north to south, is

* See above, p. 480.

crossed by the bed of the Upper Oroonoko, which flows from east to west. If we follow the course of the Rio Branco, or that stripe of cultivated land, which is dependent on the *Capitania General* of Grand Para, we see lakes, partly imaginary, and partly enlarged by geographers, forming two distinct groups. The first of these groups includes the lakes, which they place between the Esmeralda and the Rio Branco; and to the second belong those, that are supposed to lie between the Rio Branco and the mountains of Dutch and French Guyana. It results from this sketch, that the question, whether there exists a lake Parima on the east of the Rio Branco, is altogether foreign to the problem of the sources of the Oroonoko.

Beside the country which we have just noticed (the *Dorado de la Parime*, traversed by the Rio Branco), another part of America is found, two hundred and sixty leagues toward the west, near the eastern back of the Cordillera of the Andes, equally celebrated in the expeditions to *Dorado*. This is the Mesopotamia between the Caqueta, the Rio Negro, the Uaupes, and the Jurubesh, of which I have given a particular account above *: it is the *Dorado* of the *Omaguas*, which contains the *lake Manoa* of Father Acunha, the *Laguna de Oro* of the Guanes, and the auri-

* In the present vol., p. 311, 319, 340.

ferous land, whence Father Fritz received plates of beaten gold in his mission on the Amazon, toward the end of the seventeenth century.

The first, and above all the most celebrated enterprises attempted in search of *El Dorado* were directed toward the eastern back of the Andes of New Grenada. Fired with the ideas, which an Indian of Tacunga had given of the wealth of the king or Zaque of Cundirumarca *, Sebastian de Belalcazar, in 1535, sent his captains Anasco and Ampudia, to discover the *valley of Dorado* † twelve days journey from Guallabamba, consequently in the mountains between Pasto and Popayan. The information which Pedro de Anasco had obtained from the natives, joined to that which was received subsequently (1536) by Diaz de Pineda, who had discovered the provinces of Quixos and Canela, between the Rio Napo and the Rio Pastaca, gave

* *Herera Dec. V, Lib. 7, cap.* 14 (vol. iii, p. 178). Is it not rather the true ancient name of New Grenada, which other writers on the *Conquest* call *Cundinamarca?* It is however the last form, which has been revived in our days, in the war of the independance of the colonies.

† *El valle del Dorado.* Pineda relates, "que mas adelante de la provincia de la Canela se hallan tierras mui ricas adonde andaban los hombres armados de pieças y joyas de oro y que *no hávia sierra, ni montana.*" Herera Dec. v, lib. x, cap. xiv (tom. 3, p. 244), and Dec. vi, lib. viii, cap. vi (tom. iv, p. 180). *Geogr. Blaviana,* vol. xi, p. 261. *Southey,* tom. i, p. 78 et 373.

birth to the idea, that on the east of the *Nevados* of Tunguragua, Cayambe, and Popayan, " were vast plains, abounding in precious metals, and where the inhabitants were covered with armour of massy gold." Gonzalo Pizarro, in searching for these treasures, discovered accidentally, in 1539, the cinnamon-trees of America (laurus cinnamomoides, Mut.); and Francisco de Orellana went down the Napo, to reach the river of Amazons. Since that period expeditions were undertaken at the same time from Venezuela, New Grenada, Quito, Peru, and even from Brazil and the Rio de la Plata *, for the conquest of *Dorado*. Those, of which the remembrance have been best preserved, and which have most contributed to spread the fable of the riches of the Manaos, the Omaguas, and the Guaypes, as well as the existence of the *Lagunas de oro*, and the town of the *Gilded King (Grand Patiti, Grand Moxo, Grand Paru, or Enim)*, are the incursions made to the south of the Guaviare, the Rio Fragua, and the Caqueta. Orellana, having found idols of massy gold, had fixed men's ideas on an auriferous land between the Papamene and the Guaviare. His narrative, and those of the voyages of Jorge de Espira (George

* Nuflo de Chaves went from the Ciudad de la Asumpcion, situate on the Rio Paraguay, to discover, in the latitude of 24° south, the vast empire of Dorado, which was every where supposed to be on the eastern back of the Andes.

von Speier), Hernan Perez de Quesada, and Felipe de Urre (Philip von Huten), undertaken in 1536, 1542, and 1545, furnish, amid much exaggeration, proofs of very exact local knowledge *. When these are examined merely in a geographical point of view, we perceive the constant desire of the first *conquistadores*, to reach the land comprised between the sources of the Rio Negro, of the Uaupès (Guape), and of the Jupura, or Caqueta. This is the land, which, in order to distinguish it from the *Dorado de la Parime*, we have called above the *Dorado des Omaguas* †. No doubt the whole country between the Amazon and the Oroonoko was vaguely known by the name of *Provincias del Dorado* ‡; but in this vast extent of forests, savannahs, and mountains, the progress of those who sought the great lake with auriferous banks, and the town of the *Gilded King*, was directed toward two points only, on the north-east and south-west of the Rio Negro; that is to Parima

* We may be surprised to see, that the expedition of Huten is passed over in absolute silence by Herera. (*Dec.* 7, *lib.* 10, *cap.* vii, vol. iv, p. 238). Fray Pedro Simon gives the whole particulars of it, true or fabulous; but he composed his work from materials, that were unknown to Herera. (See above, p. 324.)

† In 1560 Pedro de Ursua even took the title of *Governador del Dorado y de Omagua.* (Fray Pedro Simon, vol. vi, chap. x, p. 430.)

‡ *Herera*, Dec. 5, lib. 9, cap. vi (vol. iii, p. 211).

(or the isthmus between the Carony, the Essequebo, and the Rio Branco), and to the ancient abode of the Manaos, the inhabitants of the banks of the Jurubesh. I have just mentioned the situation of the latter spot, which is celebrated in the history of the *conquest* from 1535 to 1560; and it remains for me to speak of the configuration of the country between the Spanish missions of the Rio Carony, and the Portugueze missions of the Rio Branco or Parima. This is the country lying near the Lower Oroonoko, the Esmeralda, and French and Dutch Guyana, on which, since the end of the sixteenth century, the enterprises and exaggerated narratives of Raleigh have shed so bright a splendour.

From the general disposition of the course of the Oroonoko, directed successively toward the west, the north, and the east, it's mouth lies almost in the same meridian as it's sources*: so that by proceeding from *Vieja Guyana* to the south the traveller passes through the whole of

* The difference does not probably exceed 3° of longitude. The Raudal of Guatharibos, east of Esmeralda, is in the longitude of 67° 38′. I believe consequently, that the sources of the Oroonoko are a little more to the east than the meridian of Santo Thomè del Angostura, which, according to my observation, is in 66° 15′ 21″. It results from the whole of my discussions on the astronomical geography of Guyana, that Vieja Guayana (long. 64° 43′) and the confluence of the Rio Branco with the Rio Negro (long. 64° 34′) do not sensibly differ in meridian.

the country, in which geographers have successively placed an inland sea *(Mar Blanco)*, and the different lakes which are connected with the fable of *el Dorado de la Parime*. We find first the Rio Carony, which is formed by the union * of two branches of almost equal magnitude, the Carony, properly so called, and the Rio *Paragua*. The missionaries of Piritu call the latter river a lake *(laguna)*: it is full of shoals, and little cascades; but, "passing through a country entirely flat, it is subject at the same time to great inundations, and it's real bed *(su verdadera caxa)* can scarcely be discovered †." The natives have given it the name of *Paragua* or *Parava* ‡, which means in the Caribbee language *sea*, or *great lake*. These local circumstances and this denomination no doubt have given rise to the idea of transforming the Rio Paragua, a tributary stream of the Carony, into a lake called *Cassipa*, on account of the Cassipagotoes §, who lived in those coun-

* Near the mission of San Pedro de las Bocas (between San Sebastian de Abaratayme and Santa Magdalena de Curucay), six leagues north-east of the Villa de Barceloneta.

† *Caulin*, p. 60. These observations of the author of the *Corografia* are so much the more remarkable, as he was entirely ignorant of the existence of a lake Cassipa on our maps.

‡ *Gili*, vol. i, p. 323.

§ Raleigh, p. 64, 69. I always quote, when the contrary is not expressly said, the original edition of 1596. Have these tribes of Cassipagotoes, Epuremei, and Orinoqueponi, so often mentioned by Raleigh, disappeared? or did some

tries. Raleigh gives this basin forty miles in breadth; and, as all the lakes of Parima must have auriferous sands, he does not fail to assert, that in summer, when the waters retire, pieces of gold of considerable weight are found there.

The sources of the tributary streams of the Carony, the Arui, and the Caura (*Caroli, Arvi,* and *Caora* *, of the ancient geographers) being very near each other †, this suggested the idea of making all these rivers take their rise from the pretended lake Cassipa ‡. Sanson has so

misapprehension give rise to these denominations? I am surprised to find the Indian words (of one of the different Caribbee dialects?) *Ezrabeta cassipuna aquerewana,* translated by Raleigh, "the great princes or greatest commander." Since *acarwana* certainly signifies a chief, or any person who commands (Raleigh, p. 6 and 7), *cassipuna* perhaps means *great,* and lake Cassipa is synonimous with *great lake.* In the same manner *Cass-iquiare* may be a great river, for *iquiare,* like *veni,* is, on the north of the Amazon, a termination common to all rivers. *Goto,* however, in Cassipa-*goto,* is a Caribbee term denoting a tribe. See above, p. 402.

* D'Anville names the Rio Caura, *Coari;* and the Rio *Arui, Aroay.* I have not been able hitherto to guess what is meant by the *Aloica* (*Atoca, Atoica* of Raleigh), which issues from the lake Cassipa, between the Caura and the Arui.

† See above, p. 582, 684, 689.

‡ Raleigh makes only the Carony and the Arui issue from it (*Hondius, Nieuwe Caerte van het wonderbare landt Guiana besocht door Sir Water Ralegh,* 1594-1596): but in posterior maps, for instance that of Sanson, the Rio Caura issues also from lake Cassipa.

much enlarged this lake, that he gives it forty-two leagues in length, and fifteen in breadth *. The ancient geographers placed opposite to each other, with very little hesitation, the tributary streams of the two banks of a river; and they place the mouth of the Carony, and lake Cassipa, which communicates by the Carony with the river Oroonoko, sometimes † *above* the confluence of the Meta. Thus it is carried back by Hondius as far as the latitudes of 2° and 3°, giving it the form of a rectangle, the longest sides ofwhic h run from north to south. This circumstance is worthy of remark, because, in assigning gradually a more southern latitude to the lake Cassipa, it has been detached from the Carony and the Arui, and has taken the name of Parima. To follow this metamorphosis in it's progressive developement, we must compare the maps which have appeared since the voyage of Raleigh till now. La Cruz, who has been copied by all the modern geographers, has preserved the oblong form of the lake Cassipa for his lake Parima, although this form is entirely different from that of the ancient lake Parima, or Ropunuwini, of which the great axis was directed from east to west. The ancient lake

* Map of *Terra Firma*, 1656.

† Sanson, *Map for the voyage of Acunha*, 1680. *Id. South America*, 1659. *Coronelli, Indes occidentales*, 1689.

(that of Hondius, Sanson, and Coronelli) was also surrounded by mountains, and gave birth to no river, while the lake Parima of La Cruz and the modern geographers communicates with the Upper Oroonoko, as the Cassipa with the Lower Oroonoko *.

I have stated the origin of the fable of the lake Cassipa, and the influence it has had on the opinion, that the lake Parima is the source of the Oroonoko. Let us now examine what relates to this latter basin, this pretended *interior sea*, called *Rupunuwini* by the geographers of the sixteenth century. In the latitude of four degrees or four degrees and a half, (in which direction unfortunately, south of Santo Thomè del Angostura to the extent of eight degrees, no astronomical observation has been made †) is a long

* Those geographers, who have effaced the ancient lake Parima from their maps, for instance Sanson (*River of the Amazons*, 1680), de Lisle (*Amér. Mérid.* 1700), d'Anville, in the first edition of *l'Amérique méridionale*, and Robert de Vaugondi (*Nouveau Monde*, 1778), have religiously preserved a lake Cassipa, the source of the Carony and the Arui. D'Anville, in the second edition of his map, indicates at the same time both the lakes Cassipa and Parima. La Cruz was too well informed by the accounts of the missionaries respecting the sources of the Caura, not to omit the Cassipa.

† If a line be drawn (west of Cayenne) through the falls of the Maroni and the Essequebo, Vieja Guayana, and the right bank of the Oroonoko, to Esmeralda, and thence through the confluence of the Rio Branco with the Rio Negro, along the latter river as far as Vistoza (on the left bank of the Amazon), and to the sources of the Oyapok, we shall have

and narrow Cordillera, that of Pacaraimo, Quimiropaca, and Ucucuamo; which, stretching from east to south-west, unites the group of mountains of Parima to the mountains of Dutch and French Guyana. It divides it's waters between the Carony, the Rupunury or Rupunuwini, and the Rio Branco; and consequently between the vallies of the Lower Oroonoko, the Essequebo, and the Rio Negro *. On the north-west of the Cordillera de Pacaraimo, which has been traversed but by a small number of Europeans (by the German surgeon, Nicolas Hortsmann, in 1739; by a Spanish officer, Don Antonio Santos, in 1775; by the Portugueze colonel, Barata, in 1791; and by several Eng-

an *area* of 48,000 square leagues, in which not a single situation has been astronomically determined. This country lies between the missions of the Oroonoko, and French and Dutch Guyana. Thus also west of the missions of the Oroonoko, between the Atabapo and the eastern back of the Andes, there are 25,000 square leagues destitute of points astronomically determined. The geographer, who would ground a map of South America on observations of latitude and longitude, finds *on the north of the Amazon* a *terra incognita* three times as big as Spain. The places which I determined astronomically between San Fernando de Apure, Javita, San Carlos del Rio Negro, and Santo Thomas del Angostura, that is, between 1° 53′ and 8° 8′ of latitude, and 66° 15′ and 70° 20′ of longitude, are very advantageously situate, since they divide this vast extent of land into two parts, and furnish fixed points on the east and west of the Oroonoko.

* See above, p. 481, 576.

lish settlers, in 1811), descend the Noeapra, the Paraguamusi, and the Paragua, which fall into the Rio Carony: on the north-east, the Rupunuwini, a tributary stream of the Rio Essequebo. Toward the south, the Tacutu and the Urariquera form together the famous Rio Parima, or Rio Branco *.

This isthmus, between the branches of the Rio Essequebo and the Rio Branco (that is, between the Rupunuwini on one side, and the Pirara, the Mahu, and the Ururicuera or Rio Parima on the other), may be considered as the classical soil of the *Dorado of Parima*. The rivers at the foot of the mountains of Pacaraimo are subject to frequent overflowings. Above Santa Rosa, the right bank of the Urariapara, a tributary stream of the Uraricuera †, is called *el Valle de*

* It would be equally well founded to assume, that the Rio Branco rises from the union of the Mahu (Mao) and the Rio Parima properly so called; for the Tacutu receives the waters of the Mahu, and the Urariquera those of the Rio Parima. When several branches of almost equal magnitude unite, the natives, as well as geographers, vary in the denomination of the new river, which rises from this junction.

† Curaricara, in the journals of don Antonio Santos and don Nicolas Rodriguez, of which I am in possession. These travellers, crossing the Cordillera of Quimiropaca, and passing by Santa Rosa, went from the Nocaprai, a tributary stream of the Paraguamusi, to the Urariapara; and thence descended toward the Portugueze fortress of San Joaquim, situate at the confluence of the Uraricuera and the Tacutu.

la Inundacion. Great pools also are found between the Rio Parima and the Xurumu. These are marked on the maps recently constructed in Brazil, which furnish the most ample details of those countries. More to the west, the *Canno* Pirara, a tributary stream of the Mahu, issues from a lake covered with rushes. This is the lake Amucu described Nicolas Hortsmann; and respecting which some Portugueze of Barcelos, who had visited the Rio Branco (Rio Parima or Rio Paravigiana *) gave me precise notions during my stay at San Carlos del Rio Negro. The lake Amucu is several leagues broad, and contains two small islands, which Santos heard called *Islas Ipomucena.* The Rupunuwini (Rupunury), on the banks of which Hortsmann discovered rocks covered with hieroglyphical figures †, approaches very near this lake, but does not communicate with it. The *portage* between the Rupunuwini and the Mahu is farther north, where the mountain of Ucucuamo ‡ rises, which

* Is this name, which I take from the oral communication of Portugueze colonists, a corruption of *Paravillanas?* La Cruz gives this name to the easternmost branch of the Rio Branco. See above, p. 374.

† See above, p. 593. On the south of the Rupunury, but below the Uanauhau (Anava), other tributary streams of the Rio Branco rise from the small lakes Curiucu, Uraricory, and Uadauhau. *Corogr. bras.,* vol. ii, p. 347.

‡ I follow the orthography of the manuscript journal of

the natives still call the *Mountain of Gold.* They advised Hortsmann, to seek round the Rio Mahu for a *mine of silver* (no doubt mica with large plates), of diamonds, and of emeralds. He found nothing but rocky crystals. His account seems to prove, that the whole length of the mountains of the Upper Oroonoko *(Sierra Parima)* toward the east is composed of granitic rocks, full of *druses* and open veins, like the Peak of Duida*. Near these lands, which still enjoy a great celebrity for their riches, on the western limits of Dutch Guyana, live the Macusis, Aturajoes, and Acuvajoes. The traveller Santos found them stationed between the Rupunuwini, the Mahu, and the chain of Pacaraimo. *It is the aspect of the micaceous rocks of the Ucucuamo, the name of the Rio Parima, the inundations of the rivers Urariapara, Parima, and Xurumu, and more especially the existence of the lake Amucu (near the Rio Rupunuwini, and regarded as the principal source of the Rio Parima), which have given rise to the fable of the White Sea and the Dorado of Parima.* All these circumstances (which have served on this very account to corroborate the general opinion) are found united on a space of ground, which is eight or nine leagues broad from north to south, and forty long from east to

Rodriguez; it is the Cerro Acuquamo of Caulin, or rather of his commentator. (*Hist. corogr.*, p. 176.)

* See above, p. 506, and 553.

west. This direction too was always assigned to the *White Sea*, by lengthening it in the direction of the latitude, till the beginning of the sixteenth century *. Now this *White Sea* is nothing but the Rio Parima, which is still called the *White River*, *Rio Branco*, or *Rio del Aguas blancas*, and runs through and inundates the whole of this land. The name of Rupunuwini † is given to the *White Sea* on the most ancient maps; which identifies the *place of the fable*, since of all the tributary streams of the Rio Essequebo the Rupunuwini is the nearest to the lake Amucu ‡. Raleigh, in his first voyage

* The latitudes of the lake Amucu and of the confluence of the Uraricuera with the Rio Parima and with the Rio Xurumu, differ very little; but on account of the direction of the Uraricuera (a western branch of the Rio Branco), which flows from west to east, the difference in the longitude becomes considerable. The *Valle de la Inundacion*, of which I have spoken above, is three degrees and a half west of lake Amucu and of the Rupunuwini, a circumstance which may have given rise to a fabulous enlargement of the *Mar Blanco*.

† See for instance the *Terra Firma* of Sanson, 1656. (Hondius, in the *map of Guyana*, 1599, writes by mistake Foponowini.)

‡ This identity of name between the lake Parima and a tributary stream of the Essequebo had already attracted the attention of D'Anville (*Journal des Savans*, 1750, p. 185), but did not prevent this learned geographer from restoring in the second edition of his *Amérique méridionale* the great lake Parima. This edition is of 1760. (*Notice des Ouvrages de D'Anville, par M. Barbié du Bocage*, p. 98.)

(1595), had formed no precise idea of the situation of el Dorado and the lake Parima, which he believed to be salt, and which he calls "another Caspian Sea." It was not till the second voyage (1596), performed equally at the expense of Raleigh, that Laurence Keymis fixed so well the localities of Dorado, that he appears to me to have no doubt of the identity of the *Parima de Manoa* with the lake *Amucu*, and with the isthmus between the Rupunuwini (a tributary stream of the Essequebo) and the Rio Parima or Rio Branco. "The Indians," says Keymis, "go up the Dessekebe (Essequebo) in twenty days, towards the south. To mark the greatness of this river, they call it the *brother of the Oroonoko*. After twenty days navigating they convey their canoes by a *portage, a single day*, from the river Dessekebe to a lake, which the Jaos call *Roponowini*, and the Caribbees *Parime*. This lake is as large as a sea; it is covered with an infinite number of canoes; and I suppose" (the Indians then had told him nothing of this), "that this lake is no other than that which contains the town of Manoa"*. Hondius has given a curious plate of this portage; and, as the mouth of the Carony was then

* *Cayley's Life of Raleigh*, vol. i, p. 159, 236, and 283. Masham, in the third voyage of Raleigh (1596), repeats these accounts of the lake Rupunuwini.

supposed to be in latitude 4° (instead of 8° 8′), the *portage* of Parima was placed close to the equator*. At the same period the Viapoco (Oyapoc) and the Rio Cayane (Maroni?) were made to issue from this lake Parima†. The same name being given by the Caribbees to the western branch of the Rio Branco has perhaps contributed as much to the imaginary enlargement of the lake Amucu, as the inundations of the various tributary streams of the Uraricuera, from the confluence of the Tacutu to the *Valle de la Inundacion.*

We have shown above, that the Spaniards took the Rio Paragua, or Parava, which falls into the Carony, for a lake, because the word *parava* signifies *sea, lake, river.* Parima seems also to denote vaguely *great water;* for the root *par* is found in the Caribbee words that designate *rivers, pools, lakes,* and the *ocean*‡. In Arabic and in Persian, *bahr* and *deria* are also applied at the same time to the sea, to lakes, and to rivers; and this practice, common to many nations in both worlds, has, on our ancient maps, converted lakes into rivers, and rivers

* *Brevis Descriptio Regni Guianæ,* 1599, p. 11, *tab.* 4.

† *Cayley,* vol. ii, p. 46. *Hakluyt,* vol. iii, p. 692.

‡ See above, vol. iii, p. 277. In Persian, the root *water (ab)* is found also in *lake (abdan).* For other etymologies of the words *Parima* and *Manoa* see *Gili,* vol. i, p. 81, and 141; and *Gumilla,* vol. i, p. 403.

into lakes. In support of what I here advance I shall appeal to very respectable testimony, that of father Caulin. " When I inquired of the Indians," says this missionary, who sojourned longer than I on the banks of the Lower Oroonoko, " what *Parima* was; they answered, that it was nothing more than a river, that issued from a chain of mountains, the opposite side of which furnished waters to the Essequebo." Caulin, knowing nothing of lake Amucu, attributes the erroneous opinion of the existence of an inland sea solely to the inundations of the plains, *a las inundaciones dilatadas por los bajos del pays**. According to him, the mistakes of geographers arise from the vexatious circumstance of all the rivers of Guyana having different names at their mouths and near their sources. " I have no doubt," he adds, " that one of the upper branches of the Rio Branco is that very Rio Parima, which the Spaniards have taken for a lake *(a quien suponian laguna)*." Such are the opinions, which the historiographer of the *expedition of the boundaries* had formed on the spot†. He could not expect, that La Cruz and

* This is also the opinion of Mr. Walkenaer (*Cosmologie*, p. 599), and of Mr. Malte-Brun (*Geogr.*, vol. v, p. 523).

† The Rio Trumbetas and the Saraca, two tributary streams of the Amazon, which Caulin takes also for branches of the Rio Branco, are entirely independant of this river. (*Hist. corogr.*, p. 86.) If father Caulin, in one of the notes

Surville, mingling old hypotheses with accurate ideas, would reproduce on their maps the *Mar Dorado*, or *Mar Blanco*. Thus, notwithstanding the numerous proofs, which I have furnished since my return from America, of the *non-existence* of an inland sea, the origin of the Oroonoko, a map has been published in my name*, on which the *Laguna* Parima figures anew.

From the whole of these statements it follows, 1st, that the Laguna Rupunuwini, or Parima of the voyage of Raleigh and of the maps of Hondius, is an imaginary lake, formed by the lake Amucu†, and the tributary streams of the Uraricuera, which often overflow their banks; 2dly, that the Laguna Parime of Surville's map is the lake Amucu, which gives rise to the Rio Pirara,

added in 1779, make mention of the *Laguna Parima* (*Lib.* 1, c. 10, p. 60), it is only to denote the lake, from which the Pirara issues. (*Gili*, vol. i, p. 325.)

* *Carte de l'Amérique, dressée sur les Observations de M. de Humboldt, par Fried.* (*Vienna*, 1818.) Notwithstanding my observation of the latitude at the rock of Culimacari, which gives 1° 53′ 42″ for San Carlos del Rio Negro, the equator is made to pass on this map, not between San Felipe and the mouth of the Guape, but at the confluence of the Uteta or Xie. This error is also found on the maps of Laurie and Whittle (1809), and on that of Cary (1817). See above, p. 413.

† This is the lake *Amaca* of Surville and La Cruz. By a singular mistake, the name of this lake is transformed into a village on Arrowsmith's map.

and (conjointly with the Mahu, the Tacutu, the Uraricuera or Rio Parima properly so called) to the Rio Branco; 3dly, that the Laguna Parime of La Cruz is an imaginary swelling of the Rio Parime (confounded with the Oroonoko) below the junction of the Mahu with the Xurumu. The distance from the mouth of the Mahu to that of the Tacutu is scarcely 0° 40′; La Cruz* enlarges it to 7° of latitude. He calls the upper part of the Rio Branco (that which receives the Mahu) Oroonoko, or *Puruma*. There can be no doubt of it's being the *Xurumu*, one of the tributary streams of the Tacutu, which is well known to the inhabitants of the neighbouring fort of San Joaquim. All the names† that

* The mouth of the Tacutu, which is in nearly 3° of north latitude, is (according to La Cruz) in 3° south. D'Anville had guessed better than his successors. He makes it's situation in 1° 10′ north.

† The Sierra *Mey* (*Mehi?*) and the *Atures* Indians have been placed near the lake Parima and the imaginary sources of the Oroonoko (*Caulin*, p. 81). The Caratitimani, one of the tributary streams of the eastern bank of the Rio Branco, receives in fact the Cano *Aturu*, and Santos found *Aturajoes* on the Mahu *(Mao)*. The last river has perhaps given it's name to the Sierra *Mei*, of which the Indians of Esmeralda know nothing. (See above, p. 581.) Raleigh gives the name of *Wacarima* to the chain of mountains on the north of lake Parima, or lake *Rupunuwini*. We have just seen, that the Cordillera of *Pacaraymo* extends in fact to the north of the *Rupunuwini*, the Rio *Xurumu*, and the Rio *Parima*, tributary streams of the Uraricuera. The *Majanaos* (Maanaos?),

figure in the fable of Dorado are found in the tributary streams of the Rio Branco. Slight local circumstances, joined to the remembrances of the salt lake of Mexico, more especially of the celebrated lake Manoa in the *Dorado des Omaguas*, have served to complete a picture created by the imagination of Raleigh, and his two lieutenants Keymis and Masham. The inundations of the Rio Branco, I conceive, may be compared at the utmost to those of the Red river of Louisiana, between Natchitotches and Cados, but not to the *Laguna de los Xarayes*, which is a temporary swelling of the Rio Paraguay*.

Indians who now wander on the south-east of the lake Amacu, have been confounded, as Mr. Buache has well observed, with the *Manaos* (Manoas) of Jurubesh, celebrated in the history of the Dorado of the Omaguas and of the *lake Manao*, on the south of the Rio Negro. (*Carte générale de la Guyane*, 1797.) La Cruz calls the *White Sea* (which is an imaginary dilatation of the *White River*, or Rio Branco) *Parana-Pitinga*; but, among the Omaguas of the Upper Maragnon, the Brazilians or northern Guaranies, and the Caribbees, consequently among nations more than 360 leagues distant from each other, *parana* signifies both a *river* and a *lake*. The Europeans give the name of *Rio Parana* to the eastern branch of the Rio de la Plata; which is as if they said, *Rio Flumen*. The river, that separates the provinces of Almaguer and Pasto, is called in the same manner *Rio Mayo*, though *mayu*, in the fine language of the Incas, signifies river in general.

* *Southey*, vol. i, p. 130. These periodical overflowings of the Rio Paraguay have long acted the same part in the

We have now examined a White Sea*, which the principal trunk of the Rio Branco is made to traverse; and another† which is placed on the east of this river, and communicates with it by the *Cano* Pirara. A third lake‡ is figured on the west of the Rio Branco, respecting which I found recently some curious details in the manuscript journal of the surgeon Hortsmann. "At the distance of two days' journey below the confluence of the Mahu (Tacutu) with the Rio Parima (Uraricuera) a lake is found on the top of a mountain. This lake is stocked with the same fish as the Rio Parima; but the waters of the former are black, and those of the latter white §." May not Surville, from a vague notion of this basin, have imagined, in his map prefixed

southern hemisphere, as lake Parima has been made to perform in the northern. Hondius and Sanson have made the Rio de la Plata, the Rio Topajos (a tributary stream of the Amazon), the Rio Tocantines, and the Rio de San Francisco, issue from the Laguna de los Xarayes.

* That of D'Anville and La Cruz, and of the greater part of the modern maps.

† The lake of Surville, which takes the place of lake Amucu.

‡ The lake which Surville calls *Laguna tenida hasta ahora por la Laguna Parime.*

§ "Aos 24 de junho 1740. Rio Parima, no qual logo, 2 dias depois da minha entrada, esta hum monte, o qual tem hum grande lago no cima; o qual fiz ver e achei peixe, no dito lago, da mesma sorte como se acham no mesmo Rio; demais a agua he preta no lago, e no Rio Branco."

to father Caulin's work, an Alpine lake of ten leagues in length, near which, towards the east, rise at the same time the Oroonoko, and the Rio Idapa, a tributary stream of the Rio Negro? However vague may be the account of the surgeon of Hildesheim, it is impossible to admit, that the mountain, which has a lake at it's summit, is to the north of the parallel of 2° 30′: and this latitude coincides nearly with that of the Cerro Unturan. Hence it follows, that the Alpine lake of Hortsmann, which has escaped the attention of D'Anville, and which is perhaps situate amid a group of mountains, lies north-east of the *portage* from the Idapa to the Mavaca, and south-east of the Oroonoko, where it goes up above Esmeralda*.

Most of the historians, who have treated of the first ages of the conquest, seem persuaded, that the name *provincias* or *pais del Dorado* denoted originally every region abounding in

* See my itinerary map, Pl. 16; and above, p. 375 and 556. This reasoning is founded on the latitude of Esmeralda, which I found to be 3° 11′. A lake situate to the north of the Cerro Unturan, and on the banks of which the Portugueze colonists gather the *pichurim bean*, seems to prove, that there exist Alpine lakes in the unknown land between the Oroonoko and the Idapa. There are probably 4° of longitude between the point of the Rio Branco, which Hortsmann had reached on the 24th of June, 1740, and the *Raudal des Guaharibos*, the last point of the Upper Oroonoko, of which we have at present any certain knowledge.

gold. Forgetting the precise etymology of the word *Dorado (the gilded)*, they have not perceived, that this tradition is a *local fable*, as were almost all the ancient *fables* of the Greeks, the Hindoos, and the Persians. The history of the *Gilded Man* belongs originally to the Andes of New Grenada, and particularly to the plains in the vicinity of their eastern side: we see it progressively advance, as I observed above, three hundred leagues toward the east-north-east, from the sources of the Caqueta to those of the Rio Branco and the Essequebo. Gold was sought in different parts of South America before 1536, without the word *Dorado* having been ever pronounced, and without the belief of the existence of any other centre of civilization and wealth, than the empire of the Inca of Cuzco. Countries which now do not furnish commerce with the smallest quantities of the precious metals, the coast of Paria, Terra Firma *(Castilla del Oro)*, the mountains of *Saint Martha*, and the isthmus of Darien, then enjoyed the same celebrity, which has been more recently acquired by the auriferous lands of Sonora, Choco, and Brazil*.

* I have developed the causes of the apparent riches of coasts recently discovered, in a work, which treats particularly of the accumulation of the precious metals in Europe and Asia, *Essai Polit. sur la Nouv. Esp.*, tom. ii, chap. 2, p. 646.

Diego de Ordaz (1531) and Alonzo de Herera (1535) directed their journeys of discovery along the banks of the Lower Oroonoko. The former is the famous *conquistador* of Mexico, who boasted* that he had taken sulphur out of the crater of the Peak of Popocatepetl, and whom the emperor Charles V permitted to bear a burning volcano in his arms. Ordaz, named *adelantado* of all the country which he could conquer between Brazil and the coast of Venezuela, which was then called the country of the German Company of Welsers *(Belzares)* of Augsbourg, began his expedition by the mouth of the Maragnon. He there saw, in the hands of the natives, "emeralds as big as a man's fist." They were no doubt pieces of those *saussurite jade*, or compact feldspar, which we brought home from the Oroonoko, and which Mr. de la Condamine found in abundance at the mouth of the Rio Topayos†. The Indians related to Diego de Ordaz, "that on going up during a certain number of suns toward the west, he would find a large rock *(pena)* of green stone;" but before they reached this pretended mountain of emerald (rocks of euphotide?) a shipwreck put an end to all farther discovery. The Spaniards saved themselves with difficulty in

* Ib. vol. ii, p. 672.

† See above, p. 380, 392.

two small vessels. They hastened to get out of the mouth of the Amazon; and the currents, which in those parts run with violence to the north-west, led Ordaz to the coast of Paria, where in the territory of the cacique *Yuripari (Uriapari, Viapari)*, Sedeno had constructed the *Casa fuerte de Paria**. This post being very near the mouth of the Oroonoko, the Mexican *conquistador* resolved to attempt an expedition on this great river. He sojourned first at Carao (Caroa, Carora), a large Indian village, which appears to me to have been a little to the east of the confluence of the Carony; he then went up the Cabruta (Cabuta, Cabritu), and to the mouth of the Meta *(Metacuyu)*, where he found great difficulty in passing his boats through the Raudal of Cariven. We have seen above, that the bed of the Oroonoko near the mouth of the Meta is filled with shoals. The Aruacas, whom Ordaz employed as guides advised him to go up the Meta; where, on advancing towards the west, they asserted he

* This station, and those of Cubagua, Araya, and Macarapana (Amaracapan), were celebrated in the 16th century, as are in our days those of Sierra Leone and Port Jackson. The situation of the *fortress of Paria* appears to me to have been, not on the coast of Paria, but to the south of it, between the Guarapiche and the mouth of the Cano Manamo. Very ancient maps sometimes even place the *Fuerte* in the delta of the Oroonoko. It must be observed too, that the name of Paria was then applied to a great part of South America.

would find men clothed, and gold in abundance. Ordaz pursued in preference the navigation of the Oroonoko, but the cataracts of Tabaje (perhaps even those of the Atures) compelled him to terminate his discoveries*.

It is worthy of remark, that in this voyage, far anterior to that of Orellana, and consequently the greatest which the Spaniards had then performed on a river of the New World, the name of the Oroonoko was for the first time heard. Ordaz, the leader of the expedition, affirms, that the river, from it's mouth as far as the confluence of the Meta, is called *Uriaparia*, but that above this confluence it bears the name of *Orinucu*. This word (formed analogously with the words *Tamanàcu*, *Otomacu*, *Sinarucu*) is in fact of the Tamanac tongue; and, as the

* *Herera*, Dec. 4, p. 219; Dec. 5, p. 22. *Fray Pedro Simon*, p. 170-28. *Caulin*, p. 142. *Southey*, vol. 1, p. 78 Ordaz gives no name to the cataracts by which he was stopped; but those, which I have mentioned in the text, appear to me to be clearly indicated by their geographical situation. (See above, vol. iv, p. 561, and 569.) Father Caulin confounds the Raudal of Cariven with that of Camiseta; and the Raudal of Tabaje, near San Borja, with that of Carichana; though historians place the first *(una cinta de penas)* below Cabruta, and the cataract which prevented all farther navigation above the confluence of the Meta. Admitting that the distances are not much exaggerated in the narratives of the *conquistadores*, we may believe, that Ordaz went as far as the Raudal of Atures.

Tamanacs dwell south-east of Encaramada, it is natural, that the *conquistadores* heard the actual name of the river only on drawing near the Rio Meta*. On this last tributary stream Diego de Ordaz received from the natives the first idea of

* *Gili*, vol. iii, p. 381. The following are the most ancient names of the Oroonoko, known to the natives near it's mouth, and which historians give us altered by the double fault of pronunciation and orthography; *Yuyapari, Yjupari, Huriaparia, Uriapari, Viapari Rio de Paria.* The Tamanac word *Orinucu* was disfigured by the Dutch pilots into *Worinoque.* The Otomacs say *Joga-apurura* (great river); the Cabres and Guaypunabis, *Paragua, Bazagua, Parava,* three words signifying great water, river, sea. That part of the Oroonoko between the Apure and the Guaviare is often denoted by the name of *Baraguan.* A famous strait, which we have described above, bears also this name, which is no doubt a corruption of the word Paragua. Great rivers in every zone are called by the dwellers on their banks *the river,* without any particular denomination. If other names be added, they change in every province. Thus the small Rio Turiva, near the Encaramada, has five names in the different parts of it's course. The Upper Oroonoko, or *Paragua,* is called by the Maquiritares (near Esmeralda) *Maraguaca,* on account of the lofty mountains of this name near Duida. (See above, vol. iii, p. 276; vol. iv, p. 502; and the present vol. p. 219, 478. *Gili,* vol. i, p. 22 and 364. *Caulin,* p. 75.) In most of the names of the rivers of America we recognize the root *water.* Thus *yacu* in the Peruvian, and *veni* in the Maypure, signify *water* and *river.* In Lule I find *fo,* water; *foyavalto,* a river; *foysi,* a lake; as in Persian, *ab* is water; *abi frat,* river Euphrates; *abdan,* a lake. The root water is preserved in the derivatives.

civilized nations, who inhabited the table-lands of the Andes of New Granada; "of a very powerful prince with one eye (*indio tuerto*), and of animals less than stags, but fit for riding like Spanish horses." Ordaz had no idea, that these animals were the *lamas*, or *ovejas del Peru*. Must we admit, that the lamas, which were used in the Andes to draw the plough and as beasts of burden, but not for riding, were already common on the north and east of Quito? I find, that Orellana saw these animals at the river of Amazons, above the confluence of the Rio Negro, consequently in a climate very different from that of the table-land of the Andes*. The fable of an army of Omaguas mounted on lamas served to embellish the account given by the fellow travellers of Felipe de Urre of their adventurous expedition to the Upper Caqueta. We cannot be sufficiently attentive to these traditions, which seem to prove, that the domestic animals of Quito and Peru had already begun to descend the Cordilleras, and spread themselves by degrees in the eastern regions of South America.

Herera, the treasurer of the expedition of Ordaz, was sent in 1533 by the governor Geronimo de Ortal, to pursue the discovery of the Oroonoko and the Meta. He lost nearly thir-

* *Herera*, Dec. 6, p. 195.

teen months between Punta Barima and the confluence of the Caroni in constructing flat-bottomed boats, and making the preparations indispensable for a long voyage. We cannot read without astonishment the narrative of those daring enterprises, in which three or four hundred horses were embarked, to be put ashore whenever cavalry could act on one of the banks. We find in the expedition of Herera the same stations, which we already knew; the fortress of Paria, the Indian village of Uriaparia (no doubt below Imataca, on a point where the inundations of the *Delta* prevented the Spaniards from being able to procure firewood), Caroa, in the province of Carora*; the rivers Caranaca (Caura?) and Caxavana (Cuchivero?);

* Probably the territory of the missions of Carony, inhabited by Caribbees, along the Rio Aquire (*Aquil* of Herera). The initial syllable *car* denotes a Caribbee origin, as in Cariaco, Carupano, Caripe, Caroni (Caruni), Carapo, &c. (*Garcia, del Origen de los Indios*, p. 234). Caribana, near the gulf of Darien, the ancient seat of the Caribbees, was called Cariai. (*Petr. Martyr*, p. 242, 255. *Churchill*, p. 608. *Gomara*, p. 35. *Lettera rarissima di Christ.* (*Colombo*, 1810, p. 25.) The ancient name of the island of Guadaloupe was *Carucueira*; and that of the island of Trinidad, *Cairi*. (*Geraldini*, p. 193.) A great number of the geographical names of those regions were no doubt *significative*, since they are found several times along the coast of Paria, and in the West India islands; such as *Tacarigua, Cumana, Chuparipari, Arauca, Cariero*, and *Gauya-Guajare*.

the village of Cabritu (Cabruta), and the Raudal* near the mouth of the Meta (probably the Raudal of Cariven and the Piedra de la Paciencia). As the Rio Meta, on account of the proximity of it's sources and of it's tributary streams to the auriferous Cordilleras of new Grenada (Cundinamarca), enjoyed great celebrity, Herera attempted to go up this river. He there found nations more civilized than those of the Oroonoko, but that fed on the flesh of *mute dogs*†. Herera was killed in battle by an arrow poisoned with the juice of *curare (yierva)*; and when dying named Alvaro de Ordaz his lieutenant, who led the remains of the expedition (1535) to the fortress of Paria, after having lost the few horses, which had resisted a campaign of eighteen months.

Confused reports which were circulated on the wealth of the inhabitants of the Meta, and the other tributary streams that descend from the eastern side of the Cordilleras of New Grenada, engaged successively Geronimo de Ortal, Nicolas Federmann, and Jorge de Espira (Georg von Speier), in 1535 and 1536, to undertake expeditions by land towards the south and south-

* "La singla de peñascos, vista por Ordaz, que travesa el rio por debaxo las aguas y que hace gran oleaje." *Fray Pedro Simon*, p. 227. *Herera*, Dec. V, p. 116, 155, 212. *Caulin*, p. 150, 153.

† See above, p. 671.

west. From the promontory of Paria as far as Cabo de la Vela, little figures of molten gold had been found in the hands of the natives, as early as the years 1498 and 1500. The principal markets for these amulets, which the women used as ornaments, were the villages of Curiana (Coro) and Cauchieto* (near the Rio la Hacha). The metal employed by the founders of Cauchieto came from a mountainous country more to the south. It may be conceived, that the expeditions of Ordaz and Herera served to increase the desire of drawing nearer to those auriferous countries. Georg von Speier left Coro (1535), and penetrated by the mountains of Merida to the banks of the Apure and the Meta. He passed these two rivers near their sources, where they have but little breadth. The Indians told him, that farther on white men wandered about the plains. Speier, who imagined that he was not far from the banks of the Amazon, had no doubt, that these wandering Spaniards were men unfortunately shipwrecked in the expedition of Ordaz. He crossed the savannahs of San Juan de los Llanos, which were said to abound in gold; and made a long stay at an Indian village, called *Pueblo de Nuestra Senora*, and afterward la Fragua†, south-

* See above, vol. iii, p. 526.

† This Indian village, the name of which the Spaniards

east of the Paramo de la Suma Paz. I have been on the western back of this group of mountains, at Fusagasuga, and there heard, that the plains, by which they are skirted toward the east, still enjoy some celebrity for wealth among the natives. Speier found in the populous village of la Fragua a *Casa del Sol* (temple of the Sun), and a convent of virgins, similar to those of Peru and New Grenada. Were these the consequence of a migration of religious rites toward the east? or must we admit, that the plains of San Juan were their first cradle? Tradition indeed records, that Bochica, the legislator of New Grenada, and high-priest of Iraca, had gone up from the plains of the east to the table-land of Bogota. But Bochica being at once the offspring and the symbol of the Sun, his history may contain allegories, that are merely astrological*. Speier, pursuing his way toward the south, and crossing the two branches of the Guaviare, which are the Ariare and the Guayavero (Guayare or Canicamare), arrived on the banks of the great Rio Papamene† or Caqueta.

have changed, is not situate on the Rio Fragua itself, one of the branches of the Caqueta, for Speier passed the Rio Ariare after having sojourned in the village of Fragua.

* See my *Views of the Cordilleras and American Monuments*, vol. ii, (or xiv of the present work) p. 135.

† See above, p. 319. The geographer La Cruz Olmedilla, gives the name of Papemene to the little river Timana,

The resistance he met with during a whole year in the province de los Choques put an and in 1537 to this memorable expedition*. Nicolas Federmann and Geronimo de Ortal (1536), who went from Macarapana and the mouth of the Rio Neveri, followed (1535) the traces of Jorge de Espira. The former sought for gold in the Rio Grande de la Magdalena; the latter endeavoured to discover a temple of the Sun *(Casa del Sol)* on the banks of the Meta. Ignorant of the idiom of the natives, they seemed to see every where, at the foot of the Cordilleras, the reflexion of the greatness of the temples of Iraca (Sogamozo), which was then the centre of the civilization of Cundinamarca.

I have now examined in a geographical point

which falls into the Rio Magdalena above the Rio Suaza; but Fray Pedro Simon leaves no doubt respecting the real course of the Papamene (a name which signifies *river of silver*). He says expressly (p. 332 and 666); "nace este gran rio a la parte del este de las Cordilleras de Timana, como las aguas del oeste caen al rio de la Magdalena." The provincial of New Grenada, Fray Pedro Simon, composed his memoirs from those of the Adelantado Gonzalo Ximenez de Quesada, whose government "tenia por terminos por la parte del este la provincia de Papamene." He must therefore have been well informed of the localities. Raleigh believes erroneously, that the Rio Papamene is the river, by which Orellana proceeded down to the Amazon. He confounds the Napo with the Caqueta. (*Ralcigh*, p. 13.)

* *Fray Pedro Simon*, p. 171, 179, 188, 202, 278: and *Herera. Descr. geogr.*, p 32

of view, the expeditions on the Oroonoko, and in a western and southern direction on the eastern back of the Andes, before the tradition of *el Dorado* was spread among the *conquistadores*. This tradition, as we have noticed above, had it's origin in the kingdom of Quito, where Luis Daza (1535) met with an Indian of New Grenada, who had been sent by his prince (no doubt the *zippa* of Bogota, or the *zaque* of Tunja), to demand assistance from Atahualpa, inca of Peru. This ambassador boasted, as is usual, the wealth of his country; but what particularly fixed the attention of the Spaniards, who were assembled with Daza in the town of Tacunga (Llactacunga), was the history of a lord, "who, his body covered with powdered gold, went into a lake amid the mountains*." This lake may have been the Laguna de Totta, a little to the east of Sogamozo (Iraca) and of Tunja (Hunca, the town of Huncahua), where two chiefs, ecclesiastical and secular, of the empire of Cundinamarca, or Cundirumarca, resided; but no historical remembrance being attached to this mountain lake, I rather suppose, that it was the *sacred lake of Guatavita*†, on the

* *Herera*, Dec. V, p. 179 and 245. *Fray Pedro Simon*, p. 327. *Piedrahita*, p. 75. Lettera di Fernando Oviedo al Cardinale Bembo de' 20 Gennajo 1543, in *Ramusio Coll.*, tom. iii, p. 416.

† *Views of the Cordilleras*, vol. ii, (or xiv), Pl. 67. *Herera, Descr. geogr.*, p. 32.

east of the mines of rock salt of Zipaquira, into which the gilded lord was made to enter. I saw on it's banks the remains of a staircase hewn in the rock, and serving for the ceremonies of ablution. The Indians said, that powder of gold and golden vessels were thrown into this lake, as a sacrifice to the idols of the *adoratorio de Guatavita*. Vestiges are still found of a breach, which was made by the Spaniards for the purpose of draining the lake. The temple of the Sun at Sogamozo being pretty near the northern coasts of Terra Firma, the notions of the *gilt man* were soon applied to a high priest of the sect of Bochica, or Idacanzas, who every morning, before he performed his sacrifice, caused powder of gold to be stuck upon his hands and face, after they had been smeared with grease. Other accounts, preserved in a letter of Oviedo addressed to the celebrated cardinal Bembo say, that Gonzalo Pizarro, when he discovered the province of cinnamon trees, "sought at the same time a great prince, noised in those countries, who was always covered with powdered gold, so that from head to foot he resembled *a una figura d'oro lavorata di mano d'un buonissimo orifice*. The powdered gold is fixed on the body by means of an odoriferous resin ; but, as this *kind of garment* would be uneasy to him while he slept, the prince washes himself every evening, and is gilded anew in the morning, which proves,

that the empire of *el Dorado* is infinitely rich in mines." It seems probable, that there was something in the ceremonies of the worship introduced by Bochica, which gave rise to a tradition so generally spread. The strangest customs are found in the New World. In Mexico the sacrificers painted their bodies, and wore a kind of cope with hanging sleeves of tanned human skin. I have published drawings of them made by the ancient inhabitants of Anahuac, and preserved in the books of their rituals.

On the banks of the Caura, and in other wild parts of Guyana, where *painting* the body is used instead of *tatooing*, the nations anoint themselves with turtle fat, and stick spangles of mica with metallic lustre, white as silver, and red as copper, on their skin, so that at a distance they seem to wear laced clothes. The fable of the *gilded man* is perhaps founded on a similar custom; and, as there were two sovereign princes in New Grenada*, the lama of Iraca, and the secular chief or zaque of Tunja, we cannot be surprised, that the same ceremony was attributed sometimes to the prince, and sometimes to the high priest. It is more extraordinary, that as early as the year 1535 the country of *Dorado* was sought for on the east of the Andes. Robertson is

* According to the analogy of the ancient government of Meroë, that of Thibet, and of the *dairi* and *kubo* in Japan.

mistaken* in admitting, that Orellana received the first notions of it (1540) on the banks of the Amazon. The history of Fray Pedro Simon, founded on the memoirs of Quesada, the conqueror of Cundirumarca, proves directly the contrary; and Gonzalo Diaz Pe Pineda, as early as 1536, sought for the *gilded man* beyond the plains of the province of Quixos. The ambassador of Bogota, whom Daza met with in the kingdom of Quito, had spoken of a country situate toward the east. Was this because the table-land of New Grenada is not on the north, but on the north-east of Quito? We may venture to say, that the tradition of a naked man covered with powdered gold must have belonged originally to a hot region, and not to the cold table-lands of Cundirumarca, where I often saw the thermometer sink below four or five degrees; however, on account of the extraordinary configuration of the country, the climate differs greatly at Guatavita, Tunja, Iraca, and on the banks of the Sogamozo. Sometimes also religious ceremonies are preserved, which took rise in another zone; and the Muyscas, according to ancient traditions, made Bochica, their first legislator and the founder of their worship, arrive from the plains situate to the east of the Cordilleras. I shall not decide whether these

* Hist. of America, vol. ii, p. 215.

traditions expressed an historical fact, or merely indicated, as we have already observed in another place, that the first lama, who was the offspring and symbol of the Sun, must necessarily have come from the countries of the East. Be it as it may, it is not less certain, that the celebrity, which the expeditions of Ordaz, Herera, and Speier had already given to the Oroonoko, the Meta, and the province of Papamene, situate between the sources of the Guaviare and the Caqueta, contributed to fix the *fable of el Dorado* near to the eastern back of the Cordilleras.

The junction of three bodies of troops on the tableland of New Grenada spread through al that part of America occupied by the Spaniards the news of an immensely rich and populous country, which remained to be conquered. Sebastian de Belalcazar marched from Quito by way of Popayan (1536) to Bogota ; Nicolas Federmann, coming from Venezuela, arrived from the East by the plains of Meta. These two captains found already settled on the table land of Cundirumarca the famous *adelantado* Gonzalo Ximenez de Quesada, one of whose descendants I saw near Zipaquira, with bare feet, attending cattle. The fortuitous meeting of the three *conquistadores*, one of the most extraordinary and dramatic events of the history of the conquest, took place in 1538. Belalcazar's narratives

inflamed the imagination of warriors eager for adventurous enterprises; and the notions communicated to Luis Daza by the Indian of Tacunga were compared with the confused ideas, which Ordaz had collected on the Meta respecting the treasures of a great king with one eye *(Indio tuerto)*, and a people clothed, who rode upon lamas. An old soldier, Pedro de Limpias, who had accompanied Federmann to the tableland of Bogota, carried the first news of *Dorado* to Coro, where the remembrance of the expedition of Speier (1535—1537) to the Rio Papamene was still fresh. It was from this same town of Coro, that Felipe von Huten (Urre, Utre) undertook his celebrated voyage to the province of the Omaguas, while Pizarro, Orellana, and Hernan Perez de Quesada, brother of the *adelantado*, sought for the gold country at the Rio Napo, along the river of the Amazons, and on the eastern chain of the Andes of New Grenada. The natives, in order to get rid of their troublesome guests, continually described Dorado as easy to be reached, and situate at no considerable distance. It was like a phantom, that seemed to flee before the Spaniards, and to call on them unceasingly. It is in the nature of man wandering on the Earth, to figure to himself happiness beyond the region which he knows. *El Dorado*, similar to Atlas and the islands of the Hesperides, disappeared

by degrees from the domain of geography, and entered that of mythological fictions.

I shall not here relate the numerous enterprises, which were undertaken for the conquest of this imaginary country. Unquestionably we are indebted to them in great part for our knowledge of the interior of America; they have been useful to geography, as errors and daring hypotheses are often to the search of truth: but in the discussion on which we are employed, it is incumbent on me to rest only upon those facts, which have had the most direct influence on the construction of ancient and modern maps. Hernan Perez de Quesada, after the departure of his brother the *adelantado* for Europe, sought anew (1539), but this time in the mountainous land north-east of Bogota, the temple of the Sun *(Casa del Sol)*, of which Geronimo de Ortal had heard spoken in 1536 on the banks of the Meta. The worship of the Sun introduced by Bochica, and the celebrity of the sanctuary of Iraca, or Sogamozo, gave rise to those confused reports of temples and idols of massy gold; but on the mountains as in the plains, the traveller believed himself to be always at a distance from them, because the reality never corresponded with the chimerical dreams of the imagination. Francisco de Orellana, after having vainly sought *Dorado* with Pizarro in the *Provincia de los Canelos*, and on the auriferous banks of the Napo,

went down (1540) the great river of the Amazons. He found there, between the mouths of the Javari and the Rio de la Trinidad (Yupura ?), a province rich in gold, called Machiparo (Muchifaro), in the vicinity of that of the Aomaguas, or Omaguas. These notions contributed to carry *Dorado* toward the south-east, for the names *Omaguas* (Om-aguas, Aguas), *Dit-aguas*, and *Papamene*, designated the same country; that which Jorge de Espira had discovered in his expedition to the Caqueta*. The *Omaguas*, the *Manaos* or *Manoas*, and the *Guaypes*† (Uaupes or Guayupes) live in the plains on the north of the Amazon. They are three powerful nations, the latter of which, stretching toward the west along the banks of the Guape or Uaupe, had been already mentioned in the voyages of Quesada and Huten. These two *conquistadores*, alike celebrated in the history of America, reached by different roads the llanos of San Juan, then called *Valle de Nuestra Senora*. Hernan Perez de Quesada (1541) passed the Cordilleras of Cundirumarca, probably between the Paramos of Chingasa and Suma Paz; while Felipe de Huten, accompanied by Pedro de Limpias (the same who had carried to Venezuela the first news

* *Herera*, Dec. VI, p. 150, 195; Dec. VII, p. 239. *Laet*, p. 626. See also above, p. 664, 665.

† See above, p. 341, 342. *Herera*, Dec. VII, p. 78.

of Dorado from the tableland of Bogota), directed his course from north to south, by the road which Speier had taken to the eastern side of the mountains. Huten left Coro, the principal seat of the German factory, or company of Welser, when Henry Remboldt was it's director. After having traversed (1541) the plains of Casanare, the Meta, and the Caguan, he arrived at the banks of the Upper Guaviare (Guayuare), a river which was long believed to be the source of the Oroonoko, and the mouth of which I saw in passing by San Fernando de Atabapo to the Rio Negro. Not far from the right bank of the Guaviare Huten entered Macatoa, the city of the Guapes. The people there were clothed, the fields appeared well cultivated; every thing denoted a degree of civilization unknown in the hot region of America, which extends to the east of the Cordilleras. Speier, in his expedition to the Rio Caqueta and the province of Papamene, had probably crossed the Guaviare far above Macatoa, before the junction of the two branches of this river, the Ariari and the Guyavero. Huten was told, that on advancing more to the southeast he would enter the territory of the great nation of the Omaguas, the priest king of which was called Quareca, and which possessed numerous herds of *lamas*. These traces of cultivation, these ancient resemblances to the tableland

of Quito, appear to me very remarkable. It has already been said above, that Orellana saw *lamas* at the dwelling of an Indian Chief on the banks of the Amazon, and that Ordaz had heard mention made of them in the plains of Meta.

I pause where ends the domain of geography, and shall not follow Huten in the description either of that town of immense extent, which he *saw from afar;* or of the battle of the Omaguas, where thirty-nine Spaniards (the names of fourteen are recorded in the annals of the time) fought against fifteen thousand Indians. These false reports contributed greatly to embellish the fable of *Dorado*. The name of the town of the Omaguas is not found in the narrative of Huten; but the *Manoas*, from whom father Fritz received in the 17th century plates of beaten gold, in his mission of Yurim-Aguas, are neighbours of the Om-aguas. The name of *Manoa* subsequently passed from the country of the Amazons to an imaginary town, placed in the *Dorado de la Parima*. The celebrity attached to those countries between the Caqueta (Papamene) and the Guaupe (one of the tributary streams of the Rio Negro) excited Pedro de Ursua in 1560 to that fatal expedition, which ended by the revolt of the tyrant Aguirre*.

* See above, vol. iv, p. 257, where we have given the translation of a letter addressed to Philip II by Aguirre.

Ursua, in going down the Caqueta to enter the river of the Amazons, heard of the province of *Caricuri**. This denomination clearly indicates the *country of gold*, for I find that this metal is called *caricuri* in the Tamanac, and *carucuru* in the Caribbee. Is it a foreign word, that denotes *gold* among the nations of the Oroonoko, as the words *sugar* and *cotton* are in our European languages? This would prove, that these nations learned to know the precious metals among the foreign products, which came to them from the Cordilleras†, or from the plains at the eastern back of the Andes.

We arrive now at the period when the *fable of Dorado* was fixed in the eastern part of Guyana, first at the pretended lake Cassipa (on the banks of the Paragua, a tributary stream of the Carony), and afterward between the sources of the Rio Essequebo and the Rio Branco. This circumstance has had the greatest influence on the state of geography in those countries. Antonio de Berrio, son in law‡ and sole heir of the great

* Fray Pedro Simon, p. 422.

† In Peruvian or Quichua *(lengua del Inga)* gold is called *cori*, whence are derived *chichicori*, gold in powder, and *cori-koya*, gold ore.

‡ Properly "casado con una sobrina." (*Fray Pedro Simon*, p. 597 and 608. *Harris, Coll.*, vol. ii, p. 212. *Laet*, p. 652. *Caulin*, p. 175.) Raleigh calls Quesada *Cemenes de Casada*. He also confounds the periods of the voyages of

adelantado Gonzalo Ximenez de Quesada, passed the Cordilleras to the east of Tunja*, embarked on the Rio Casanare, and went down by this river, the Meta, and the Oroonoko, to the island of Trinidad. We scarcely know this voyage except by the narrative of Raleigh; it appears to have preceded a few years the first foundation of *Vieja Guayana*, which was in the year 1591. A few years later (1595) Berrio caused his *maese de campo*, Domingo de Vera, to prepare in Europe an expedition of two thousand men to go up the Oroonoko, and conquer *Dorado*, which then began to be called the *country of the Manoa*, and even the *Laguna de la gran Manoa*. Rich landholders sold their farms, to take part in a croisade, to which twelve Observantin monks, and ten secular ecclesiastics were annexed. The

Ordaz (*Ordace*), Orellana (*Oreliano*), and Ursua. See *Empire of Guiana*, p. 13—20.

* No doubt between the Paramos of Chita and of Zoraca, taking the road of Chire and Porc. Berrio told Raleigh, that he came from the Rio Casanare to the Pato, from the Pato to the Meta, and from the Meta to the *Baraguan* (Oroonoko). We must not confound this Rio *Pato* (a name connected no doubt with that of the ancient mission of *Patuto*) with the Rio Paute. (See my *Atlas*, Pl. 19.) The Meta bears erroneously on the maps of the 17th century the name of *Baraguan (Churchill*, Coll., vol. viii, p. 757), of San Pedro, and of Rio Barquecimito. The last is a tributary stream of the Portuguesa and the Apure.

tales related by one Martinez* (Juan Martin de Albujar?), who said he had been abandoned in

* I believe I can demonstrate, that the fable of *Juan Martinez*, spread abroad by the narrative of Raleigh, was founded on the adventures of Juan Martin de Albujar, well known to the Spanish historians of the Conquest; and who, in the expedition of Pedro de Silva (1570), fell into the hands of the Caribbees of the Lower Oroonoko. This Albujar married an Indian woman, and became a savage himself, as happens sometimes in our days on the western limits of Canada, and of the United States. After having long wandered with the Caribbees, the desire of rejoining the Whites led him by the Rio Essequebo to the island of Trinidad. He made several excursions to Santa Fe de Bogota, and at length settled at Carora. (*Simon*, p. 591.) I know not whether he died at Portorico; but it cannot be doubted, that it was he who learned from the Caribbee traders the name of the *Manoas* (of Jurubesh). As he lived on the banks of the Upper Carony, and reappeared by the Rio Essequebo, he may have contributed also, to place the lake Manoa at the isthmus of Rupununwini. Raleigh makes his *Juan Martinez* disembark below Morequito, a village at the east of the confluence of the Carony with the Oroonoko. Thence he makes him dragged by the Caribbees from town to town, till he finds at Manoa a relation of the inca Atabalipa (Atahualpa), whom he had known before at Caxamarca, and who had fled before the Spaniards. It appears, that Raleigh had forgotten, that the voyage of Ordaz (1531) was two years anterior to the death of Atahualpa, and the entire destruction of the empire of Peru! He must have confounded the expedition of Ordaz with that of Silva (1570), in which Juan Martin de Albuzar partook. The latter, who related his tales at Santa Fe, at Venezuela, and perhaps at Portorico, must have combined what he had heard from the Caribbees with what he had

the expedition of Diego de Ordaz, and led from town to town till he reached the capital of *Dorado*, had inflamed the imagination of Berrio. It is difficult to distinguish what this *conquistador* had himself observed in going down the Oroonoko from what he said he had collected in a pretended journal of Martinez, deposited at Portorico. It appears, that in general at that period the same ideas prevailed respecting America, as those which we have long entertained in regard to Africa; it was imagined, that more civilization would be found toward the centre of the continent, than on the coasts. Already Juan Gonzalez, whom Diego de Ordaz had sent in 1531, to explore the banks of the Oroonoko, announced, that "the farther you went up this river, the more you saw the population increased*." Berrio mentions the often inundated province of *Amapaja*, between the confluence of the Meta and the Cuchivero, where he found many little idols of molten gold, similar to those which were fabricated at Cauchieto, east of Coro. He believed this gold to be a pro-

learned from the Spaniards respecting the town of the Omaguas seen by Huten, of the *gilded man* who sacrificed in a lake, and of the flight of the family of Atahualpa into the forests of Vilcabamba, and the eastern Cordillera of the Andes. (*Garcilasso*, vol. ii, p. 194.)

* "Mientras mas se subia el Rio Viapari (Orinoco), mayores se hallaban las poblaciones." *Herera*, Dec. IV, p. 220.

duct of the granitic soil, that covers the mountainous country between the Carichana, Uruana, and Cuchivero. In fact, the natives have recently found a mass of native gold* in the Quebrada del Tigre, near the mission of Encaramada. Berrio mentions on the east of the province of Amapaja the Rio Carony (Caroly), which was said to issue from a great lake, because one of the tributary streams of the Carony, the Rio Paragua (river of the *great water*), had been taken for an *inland sea*, from ignorance of the Indian languages. Several Spanish historians† believed, that this lake, the source of the Carony, was the *Grand Manoa* of Berrio; but the notions he communicated to Raleigh show, that the *Laguna de Manoa (del Dorado*, or *de Parime)* was supposed to be to the south of the Rio Paragua, transformed into *Laguna Cassipa*. "Both these basins had auriferous sands; but on the banks of the Cassipa was situate Macureguarai (Margureguaira), the capital of the cacique of Aromaja‡, and the first city of the imaginary empire of Guyana."

* See above, vol. iv, p. 471.

† "Le gran Manoa es una gran laguna que da principio á un rio, *que entra por la vanda del sur en el Orinoco* cerca la Ciudad de San Thomè." *Simon*, p. 608.

‡ *Aru-Mayu?* Is this name connected with that of the Rio *Arui*, the sources of which are so near the Rio Paragua, that it was believed to issue from the same lake as this river?

As these often inundated lands have been at all times inhabited by nations of the Caribbee race, who carried on a very active inland trade with the most distant regions, we must not be surprised, that more gold was found here in the hands of the Indians than elsewhere. The natives of the coast did not employ this metal in the form of ornaments or amulets only; but also in certain cases* as a medium of exchange. It is not extraordinary therefore, that gold has disappeared on the coast of Paria, and among the nations of the Oroonoko, since their inland communications have been impeded by the Europeans. The natives who have remained independant are in our days, no doubt, more wretched, more indolent, and in a ruder state, than they were before the *Conquest.* The king of Morequito whose son Raleigh took to England, had visited Cumana in 1594, to exchange a great quantity of images of massy gold for iron tools, and European merchandize. The unexpected appearance of an Indian chief augmented the celebrity of the riches of the Oroonoko. It was supposed, that Dorado must be near the country, from which the king of Morequito came; and as this country was often inundated, and rivers vaguely called *great seas, great basins of water,* Dorado must be on the banks of a

* Among the Teques. See above, vol. iii, p. 530.

lake. It was forgotten, that the gold, brought by the Caribbees and other trading people, was as little the produce of their soil, as the diamonds of Brazil and India are the produce of the regions of Europe, where they are most abundant. The expedition of Berrio, which had increased in number during the stay of the vessels at Cumana, la Margaretta, and the island of Trinidad, proceeded by Morequito (near Vieja Guayana) toward the Rio Paragua, a tributary stream of the Carony; but sickness, the ferocity of the natives, and the want of subsistence, opposed invincible obstacles to the progress of the Spaniards. They all perished; except about thirty, who returned in a deplorable state to the post of Santo Thome.

These disasters did not calm the ardor displayed during the first half of the 17th century in the search of *Dorado*. The governor of the island of Trinidad, Antonio de Berrio, became the prisoner of Sir Walter Raleigh, in the celebrated incursion of that navigator, in 1595, on the coast of Venezuela and at the mouths of the Oroonoko. Raleigh collected from Berrio, and from other prisoners made by Captain Preston * at the taking of Caraccas, all the

* These prisoners belonged to the expedition of Berrio and of Hernandez de Serpa. The English landed at Macuto (then Guayca Macuto), whence a white man, Villalpando, led them by a mountain path between *Cumbre* and the *Silla*

information which had been obtained at that period on the countries situate to the south of *Vieja Guayana*. He lent faith to the fables invented by Juan Martin de Albujar, and entertained no doubt either of the existence of the two lakes Cassipa and Ropunuwini, or of that of the great empire of the inca, which, after the death of Atahualpa, the fugitive princes were supposed to have founded near the sources of the Essequibo. We are not in possession of a map, that was constructed by Raleigh, and which he recommended to lord Charles Howard to keep secret. The geographer Hondius has filled up this void; and has even added to his map a table of longitudes and latitudes, among which figure the *laguna del Dorado*, and the *ville impériale de Manoas**. Raleigh, when at anchor near the Punta del Gallo † in the island

(perhaps passing over the ridge of *Galipano*) to the town of Caraccas. (*Simon*, p. 594; *Raleigh*, p. 19.) Those only who are acquainted with the situation can be sensible, how difficult and daring this enterprise was.

* *Jodocus Hondius, brevis et admiranda Descriptio Regni Guianæ*, 1599, p. 13. *Raleigh*, p. 21, 25, 46, 52, 65, 69, 72, 90, 98, 108.

† The northern part of la Punta de Icacos, which is the south-east cape of the island of Trinidad. There Christopher Columbus cast anchor, Aug. the 3d, 1498. A great confusion exists in the denomination of the different capes of the island of Trinidad; and as recently, since the expedition of Fidalgo and Churruca, the Spaniards reckon the longitudes

of Trinidad, made his lieutenants explore the mouths of the Oroonoko, principally those of

in South America west of *la Punta de la Galera* (lat. 10° 50′, long. 63° 20′. See my *Observ. Astr.*, vol. i, p. 39.) it is important to fix the attention of geographers on this point. The following is the result of my researches: Columbus called the south-east cape of the island Punta Galera, on account of the form of a rock "que desde lexos parecia galera que iba a la vela." (History of the Admiral by his son Ferdinand Columbus, in Churchill's Collection, vol. ii, p. 584. *Herera*, Dec. I, p. 80.) We see clearly by the narrative of Columbus, that from Punta de la Galera he sailed to the *west* and landed at a low cape, which he calls Punta del Arenal; this is our Punta de Icacos. In this passage, near a place (Punta de la Playa) where he stopped to take in water (perhaps at the mouth of the Rio Erin), *he saw to the south for the first time, the continent of America*, which he called Isla Santa. It was therefore the eastern coast of the province of Cumana, to the east of the Cano Macareo, near Punta Redonda, and not the mountainous coast of Paria (Isla de Gracia of Columbus), which was first discovered. Columbus relates, that, after having anchored near the Isloto del Gallo, now called El Soldado, and having passed the Boca de Sierpe, between Punta del Arenal and the continent, he sailed *to the north* through the Golfo de la Balena (G. de Paria, Golfo triste, G. de las Perlas), and saw the Boca de Dragos in that direction. On the maps of La Cruz (1775) and of Caulin (1778) the south-east cape of Trinidad (lat. 10° 9′) has continued to be named, as by Columbus, Punta Galera; which is the Punta Galeota of modern navigators. But already Hondius (in the maps of 1598, Herera (*Descripcion de los Indios*, 1615), Sanson (map of 1669), D'Anville, and all the modern English and French geographers, with the exception of Bonne (in the Atlas of Raynal), denote the north-east cape of the

Capuri*, Grand Amana (Manamo Grande), and Macureo (Macareo). As his ships drew a great deal of water, he found it difficult to enter the *bocas chicas*, and was obliged to construct flat-bottomed barks. He remarked the fires of the Tivitivas (Tibitibies), of the race of the Guaraon Indians, on the tops of the mauritia palm trees; and appears to have first brought the fruit† to Europe, *fructum squamosum, similem palmæ pini.* I am surprised, that he scarcely mentions‡ the

island of Trinidad (lat. 10° 50′), the spot which was falsely believed to have been the first seen by Columbus, by the name of Punta de la Galera.

* See above, p. 724, and 755, where I have given the topography of the delta of the Oroonoko. The name of Capure is now given to one of the *bocas chicas*, between the Pedernales and Macareo. The geographers of the 16th century were agreed to denote the *Boca de Navios* by this name. The narrative of Raleigh (p. 38—42) leaves much doubt on this subject. Is the word *Capure* significative? Raleigh (p. 72) gives this name to a northern branch of the Meta, which during more than half a century is found thus marked in all the maps of Sanson, and of those who copied him. Now this Rio Capuri, which flows out near the Cabruta, is, in my opinion, no other than the Rio Apure itself, called *Apuri* by the Indians. The *Voari* of Raleigh, a tributary stream of the Capuri, is probably the Rio Guaricu or *Vari-cu* of the Indians.

† See above, p. 535.

‡ He merely says (p. 46): "Those Spaniards which fled from *Triniado*, and also those that remained with *Carapana* in *Emeria* (now the mission of the Capuchins of Carony), were joined *in some village* upon the Orinoco."

settlement, which had been made by Berrio under the name of Santo Thomè (la Vieja Guayana). This settlement however dates from 1591; and though, according to Fray Pedro Simon, "religion and policy prohibited all mercantile connection between Christians (Spaniards) and Heretics (the Dutch and English)," there was then carried on at the end of the 16th century, as in our days, an active contraband trade by the mouths of the Oroonoko. Raleigh passed the river *Europa* (Guarapo), and "the plains of *Saymas* (Chaymas*), which extend, keeping the same level, as far as Cumana and Caraccas;" he stopped at Morequito (perhaps a little to the north of the site of the villa de Upata, in the missions of the Carony), where an old cacique confirmed to him all the reveries of Berrio on the irruption of foreign nations *(Orejones* and *Epuremei)* into Guyana. The *Raudales* or cataracts of the *Caroli* (Carony), a river which was at that period considered as the shortest way for reaching the towns of Macureguarai and Manoa, situate on the banks of lake Cassipa and of lake Rupunuwini or *Dorado*, put an end to this expedition.

Raleigh went scarcely the distance of sixty leagues along the Oroonoko; but he names the upper tributary streams, according to the vague

* See above, vol. iii, p. 221-77.

notions he had collected, the Cari, the Pao, the Apure (Capuri?), the Guarico (Voari?), the Meta*, and even, "in the province of Baraguan, the great cataract of Athule (Atures), which prevents all farther navigation." Notwithstanding Raleigh's exaggeration, so little worthy of a statesman, his narrative contains important materials for the history of geography. The Oroonoko, above the confluence of the Apure, was at that period as little known to Europeans, as in our times the course of the Niger below Sego.

* Raleigh distinguishes the *Meta* from the *Beta*, which flows into the Baraguan (the Oroonoko) conjointly with the Daune near Athule; as he also distinguishes the Casanare, a tributary stream of the Meta, and the Casnero, which comes from the south, and appears to be the Rio Cuchivero. All above the confluence of the Apure was then very confusedly known; and streams, that flow into the tributary streams of the Oroonoko, were considered as flowing into this river itself. The Apure (Capuri) and the Meta appeared long to be the same river, on account of their proximity, and the numerous branches by which the Arauca and the Apure join each other. Is the name of Beta perchance connected with that of the nation of *Betoyes*, of the plains of the Casanare and the Meta? Hondius, and the geographers who have followed him, with the exception of De L'Isle (1700), and of Sanson (1656), place the province of Amapaja erroneously to the east of the Oroonoko. We see clearly by the narrative of Raleigh (p. 26 and 72), that Amapaja is the inundated country between the Meta and the Guarico. Where are the rivers Dauney and Ubarro? The Guaviare appears to me to be the *Goavar* of Raleigh.

The names of several very remote tributary streams were known, but not their situation; and when the same name, differently pronounced, or not properly apprehended by the ear, furnished different sounds, their number was multiplied. Other errors had perhaps their source in the little interest, which Antonio de Berrio, the Spanish governor, felt in communicating true and precise notions to Raleigh; who indeed complains of his prisoner, "as being utterly unlearned, and not knowing the east from the west" (p. 28). I shall not here discuss the point, how far the belief of Raleigh, in all he relates of inland seas, similar to the Caspian sea; on "the imperial and golden city of Manoa," and on the magnificent palaces built by the emperor *Inga* of *Guyana*, in imitation of those of his ancestors at Peru, was real or pretended. The learned historian of Brazil, Mr. Southey, and the biographer of Raleigh, Sir G. Cayley, have recently thrown much light on this subject. It seems to me difficult to doubt of the extreme credulity of the chief of the expedition, and of his lieutenants. We see Raleigh adapted every thing to the hypotheses he had previously formed. He was certainly deceived himself; but when he sought to influence the imagination of queen Elizabeth, and execute the projects of his own ambitious policy, he neglected none of the artifices of flattery. He described to the

Queen " the transports of those barbarous nations at the sight of her picture;" he would have " the name of the august virgin, who knows how to conquer empires, reach as far as the country of the warlike women of the Oroonoko and the Amazon;" he asserts, that, " at the period when the Spaniards overthrew the throne of Cuzco, an ancient prophecy was found, which predicted, that the dynasty of the Incas would one day owe it's restoration to Great Britain;" he advises, that, " on pretext of defending the territory against external enemies, garrisons of three or four thousand English should be placed in the towns of the Inca, obliging this prince to pay a contribution annually to Queen Elizabeth of three hundred thousand pounds sterling;" finally, he adds, like a man who foresees the future, that " all the vast countries of South America will one day belong to the English nation.*"

* " I shewed them her majesties picture which the *Casigui* so admired and honoured, as it had been easy to have brought them idolatrous thereof.—And I further remember that *Berreo* confessed to me and others (which I protest before the Majesty of God to be true), that there was found among prophecies in Peru (at such time as the Empire was reduced to the Spanish obedience) in their chiefest temples, amongst divers others which foreshewed the losse of the said Empyre, that from *Inglatierra* those *Ingas* should be again in time to come restored.—The *Inga* would yield to her Majesty by composition many hundred thousand pounds yearely as to

The four voyages of Raleigh to the Lower Oroonoko succeeded each other from 1595 to 1617. After all these useless attempts, the ardor of research for *Dorado* has greatly diminished. No expeditions have since been formed by a numerous band of colonists; but some solitary enterprises have been undertaken, and encouraged by the governors of the provinces. The notions, which were spread by the journeys of father Acunha in 1688, and father Fritz in 1637, to the auriferous land of the Manoas of Jurubesh, and to the *Laguna de Oro**, contributed to renew the ideas of Dorado in the Portugueze and Spanish colonies north and south of the equator. At Cuenza in the kingdom of Quito, I met with some men, who were employed by the bishop Marfil, to seek at the east of the Cordilleras, in the plains of Macas, the ruins of the town of Logrono, which was believed to be situate in a country rich in gold. We learn by the journal of Hortsmann, which I have often

defend him against all enemies abroad and defray the expences of a garrison of 3000 or 4000 soldiers.—It seemeth to me that this Empyre of Guiana is reserved for the English nation." (*Raleigh*, p. 7, 17, 51, 100.)

* See above, p. 312. I found, among the valuable collections of D'Anville preserved in the *Archives of foreign affairs* at Paris (No. 9545), a curious manuscript map, tracing the journey of father Fritz. *Tabula geografica del Rio Marañon*, 1690.

quoted, that it was supposed in 1740, *Dorado* might be reached from Dutch Guyana by going up the Rio Essequebo. Don Manuel Centurion, the governor of Santo Thomè del Angostura, displayed an extreme ardor for reaching the imaginary lake of Manoa. Arimuicaipi, an Indian of the nation of the Ipurucotoes, went down the Rio Carony, and, by false narrations, inflamed the imagination of the Spanish colonists. He showed them in the southern sky the clouds of Magellan, the whitish light of which he said was the reflexion of the argentiferous rocks situate in the middle of the Laguna Parima. This was describing in a very poetical manner the splendour of the micaceous and talcky slates of his country! Another Indian chief, known among the Caribbees of Essequebo by the name of *captain Jurado*, vainly attempted to undeceive the governor Centurion. Fruitless attempts were made by the Caura and the Rio Paragua; and several hundred persons perished miserably in these rash enterprises, from which however geography has derived some advantages. Nicolas Rodriguez and Antonio Santos (1775—1780) were employed by the Spanish governor. Santos, proceeding by the Carony, the Paragua, the Paraguamusi, the Anocapra, and the mountains of Pacaraymo and Quimiropaca, reached the Uraricuera and the Rio Branco. I found some valuable informa-

tion in the journals of these perilous expeditions.

The maritime charts, which the Florentine traveller, Amerigo Vespucci*, constructed in the early years of the 16th century, as *Piloto mayor* of the *Casa de Contratacion* of Seville, and in which he placed, perhaps artfully, the words *Tierra de Amerigo*, have not reached our times. The most ancient monument we possess of the geography of the New Continent† is the Map of the World by John Ruysch, annexed to a Roman edition of Ptolemy in 1508. We there find Yucatan and Honduras (the most southern part of Mexico‡) figured as an island, by the name of *Culicar*. There is no isthmus of Panama, but a passage, which permits of a direct navigation from Europe to India. The great southern island (South America) bears the name of *Terra de Pareas*, bounded by two rivers, the Rio Lareno, and the Rio Formoso. These *Pareas* are,

* He died in 1512, as Mr. Munoz has proved by the documents of the archives of Simancas. (*Hist. del Nuevo Mundo*, vol. i, p. 17.) *Tiraboschi, Storia della Litteratura*, vol. vi, Pl. 1. p. 179, 190.

† See the learned researches of Mr. Walckenaer, in the *Bibliographie univ.*, vol. vi, p. 209, art. *Buckinck*. On the maps added to Ptolemy in 1506 we find no trace of the discoveries of Columbus.

‡ No doubt the lands between Yucatan, Cape Gracias a Dios, and Veragua, discovered by Columbus (1502 and 1503), by Solis, and by Pinçon (1506).

no doubt, the inhabitants of *Paria*, a name which Christopher Columbus had already heard* in 1498, and which was long applied to a great part of America. Bishop Geraldini says clearly, in a letter addresssd to pope Leo X in 1516, *insula illa, quæ Europa et Asia est major, quam indocti Continentem Asiæ appellant, et alii Americam vel Pariam nuncupant*†. I find in the Map of the World of 1508 no trace whatever of the Oroonoko. This river appears for the first time, by the name of *Rio dulce*, on the celebrated map constructed in 1529 by Diego Ribero, cosmographer of the emperor Charles V, which was published, with a learned commentary by Mr. Sprengel in 1795. Neither Columbus (1498), nor Alonzo de Ojeda, accompanied by Amerigo Vespucci (1499), had seen the real mouth of the Oroonoko; they confounded it with the northern opening of the gulf of Paria, to which they attributed, by an exaggeration so common to the navigators of that time, an immense volume of fresh water. It was Vicente Yanez Pinçon, who, after having discovered the mouth of the Rio Maragnon‡, first saw (1500) that of the

* Indigenæ sine ullo metu ad nostros festinant, a quibus *Pariam* vocari terram illam collegerunt. *Petr. Mart. Ocean.* 1533, p. 16.

† Alexandri Geraldini Itinerarium, p. 250.

‡ The name of *Marañon* was known fifty-nine years before

Oroonoko. He called this river *Rio dulce;* a name which, since Ribero, was long preserved on our maps, and which has sometimes been given erroneously to the Maroni, and to the Essequebo*.

The great lake Parima did not appear† on our maps till after the first voyage of Raleigh. It was Jodocus Hondius, who, as early as the year 1599, fixed the ideas of geographers, and figured the interior of Spanish Guyana as a country well known. He transformed the isthmus between the Rio Branco and the Rio Rupunuwini (one of the tributary streams of the Essequebo) into the lake *Rupunuwini, Parima,* or *Dorado,* two hundred leagues long, and forty

the expedition of Lopez de Aguirre; the denomination of the river is therefore erroneously attributed to the nickname of *maranos* (hogs), which this adventurer gave his companions in going down the river of the Amazons. Was not this vulgar jest rather an allusion to the Indian name of the river?

* See above, p. 478. The Oroonoko is also wanting on a very fine map, which bears the title of *Delineatio australis partis Americæ, authore Arnoldo Florentio a Langern.* (D'Anville's Collection of Manuscripts, No. 9179.)

† I find no trace of it on a very rare map, dedicated to Richard Hakluyt, and constructed on the meridian of Toledo. (Novus Orbis, Paris 1587.) In this map, published before the voyage of Quiros, a group of islands is marked *(Infortunatæ Insulæ)* where the Friendly Islands actually are. Ortelius (1570) already knew them. Were they islands seen by Magellan?

broad, and bounded by the latitudes of 1° 45′ south, and 2° north. This inland sea, larger than the Caspian, is sometimes traced in the midst of a mountainous country, without communication with any river*; and sometimes the Rio Oyapok (Waiapago, Japoc, Viapoco) and the Rio de Cayana† are made to issue from it. The first of these rivers, confounded in the eighth article of the treaty of Utrecht with the Rio de Vicente Pinçon (Rio Calsoëne of D'Anville) has been, even down to the late congress of Vienna, the subject of interminable discussions between the French and Portugueze diplomatists‡. The second is an imaginary prolongation§ either of the Tonnegrande, or of the Oyac

* See for instance, Hondius, *Nieuwe Caerte van het goudrycke landt Guiana*, 1599; and Sanson's Map of America, in 1656 and 1669.

† *Brasilia et Caribana, Auct. Hondio et Huelsen*, 1599.

‡ I have treated this question in a *Mémoire sur la fixation des limites de la Guyane Française*, written at the desire of the Portugueze government, during the negociations of Paris in 1817. (See *Schoell, Archives polit.*, or *Pièces inédites*, vol. i, p. 48—58.) Ribero, in his celebrated map of the world of 1529, places the Rio de Vicente Pinçon south of the Amazon, near the gulf of Maranhao. This navigator landed at this spot, after having been at Cape Saint Augustin, and before he reached the mouth of the Amazon. *Herera*, Dec. I, p. 107. The narrative of *Gomara, Hist. nat.*, 1553, p. 48, is very confused in a geographical point of view.

§ "Cujanæ flumen longe altius penetrat in Continentem." (*Laet*, p. 640,) On comparing the maps of French Guy-

(Wia ?). The inland sea *(Laguna Parime)* was at first placed in such a manner, that it's western extremity coincided with the meridian of the confluence of the Apure and the Oroonoko. By degrees it was advanced toward the east*, the western extremity being found to the south of the mouth of the Oroonoko. This change produced others in the respective situations of the lakes Parima and Cassipa, as well as in the direction of the course of the Oroonoko. This great river is represented as running, from it's *delta* as far as beyond the Meta, from south to north, like the river Magdalena. The tributary streams therefore, which were made to issue from the lake Cassipa, the Carony, the Arui, and the Caura, then took the direction of the latitude, while in nature they follow that of a meridian. Beside the lakes Parima and Cassipa, a third was traced upon the maps, from which the Aprouague (Apurwaca) was made to issue. It was then a general practice among geographers, to attach all the rivers to great lakes. By this means Ortelius joined the Nile to the Zaire or Rio Congo, and the Vistula to the Wolga and the Dnieper. North of Mexico, in the pre-

ana, we observe, since D'Anville, a great confusion in the denomination of the little rivers between the Aprouague and the Maroni.

* Compare the maps of 1599 with those of Sanson (1656) and of Blæuw (1633).

tended kingdoms of Quivira and Cibola, rendered celebrated by the falsehoods of the monk Marcos de Niza, a great inland sea was imagined, from which the Rio Colorado of California was made to issue*. A branch of the Rio Magdalena flowed to the Laguna de Maracaybo; and the lake of Xarayes, near which a *southern Dorado*† was placed, communicated with the Amazon, the Miari‡ (Meary), and the Rio de

* This is the *Mexican Dorado*, where it was pretended, that vessels had been found on the coasts (of New Albion?) loaded with the merchandize of Catayo and China (*Gomara Hist, Gen.* p. 117), and where Fray Marcos (like Huten in the country of the Omaguas) had *seen from afar* the gilded roofs of a great town, one of the *Siete Ciudades*. The inhabitants have great dogs, *en los quales quando se mudan cargan su menage*. (*Herera*, Dec. VI, p. 157, 206.) Later discoveries however leave no doubt, that there existed a centre of civilization in those countries. (See my Political Essay on New Spain, vol. i. p. 298, 310; vol. ii, p. 582.)

† *Herera, Descripcion de las Indias*, p. 53.

‡ As this river flows into the gulf of *Maranhao* (so named because some French colonists, Rifault, De Vaux, and Ravardière, believed they were opposite the mouth of the *Maragnon* or Amazon), the ancient maps call the Meary *Maragnon*, or *Maranham*. (See the maps of Hondius, and Paulo de Forlani.) Perhaps the idea, that Pinçon, to whom the discovery of the real Maragnon is due, had landed in those parts, since become celebrated by the shipwreck of Ayres da Cunha, has also contributed to this confusion. The Meary appears to me identical with the *Rio de Vicente Pinçon of Diego Ribero*, which is more than one hundred and forty leagues from that of the modern geographers. (See above,

San Francisco. These hydrographic reveries have for the most part disappeared; but the lakes Cassipa and Dorado have been long simultaneously preserved on our maps.

In following the history of geography, we see the Cassipa, figured as a rectangular parallelogram, enlarge by degrees at the expense of the Dorado. While the latter is sometimes suppressed, no one ventures to touch the former*, which is the Rio Paragua (a tributary stream of the Caroni) enlarged by temporary inundations. When D'Anville learned from the expedition of Solano, that the sources of the Oroonoko, far from lying to the west, on the back of the Andes of Pasto, came from the east, from the mountains of Parima, he restored in the second edition of his fine map of America (1760) the *Laguna Parime*, and very arbitrarily made it to communicate with three rivers, the Oroonoko, the Rio Branco, and the Essequebo, by the Mazuruni and the Cujuni; assigning to it the latitude, from 3° to 4° north, which had till then been given to lake Cassipa.

p. 474.) At present the name of Maragnon has remained at the same time to the river of the Amazons, and to a province much farther eastward, the capital of which is Maranhao, or Saint Lewis de Maragnon.

* *Sanson*, Course of the Amazon, 1680; De L'Isle, *Amérique Mérid.*, 1700. D'Anville, first edition of his America, 1748.

La Cruz Olmedilla, the Spanish geographer, followed, in 1775, the example set by D'Anville. The ancient lake Parima, situate under the equator, was entirely independant of the Oroonoko; the new, which appeared in the place of the Cassipa, and in the same form of a quadrilateral, the longest sides of which lie from south to north *, furnishes the most singular hydraulic communications. The Oroonoko, in the map of La Cruz, under the names of Parima and Puruma (Xuruma?), takes it's rise in the mountainous land between the sources of the Ventuari and of the Caura (in the latitude of five degrees, and in the meridian of the mission of Esmeralda), from a small lake called *Ipava*. This lake would be placed in my itinerary map to the north-east of the granitic mountains of Cunevo, a situation which sufficiently proves, that it might be the origin of a tributary stream of the Rio Branco or the Oroonoko, but not the origin of the Oroonoko itself. This Rio Parima, or Puruma, after a course of forty leagues east-north-east, and sixty leagues south-east, receives the Rio Mahu, which is already known to us as one of the principal branches of the Rio Branco; it then enters into the lake Parima, which is supposed to be thirty leagues long and twenty

* The greater axis of the real lake of Parima was from east to west.

broad. From this lake three rivers immediately issue, the Rio Ucamu (Ocamo), the Rio Idapa (Siapa), and the Rio Branco. The Oroonoko, or Puruma, is indicated, as a subterraneous filtration, at the western back of the *Sierra Mei*, which skirts the lake or *White Sea* on the west. This second source of the Oroonoko is found in two degrees of north latitude, and thirty degrees and a half east of the meridian of Esmeralda. The new river, after a course of fifty leagues west-north-west, receives first the Ucamu, which issues from the lake Parima; and then the Rio Maquiritari (Padamo), which rises between the lake Ipava and another Alpine lake, called by La Cruz *Laguna Cavija*. The word lake being *cavia* in Maypure, the denomination of *Laguna Cavia* signifies, like Laguna Parime, simply a basin of water, *Laguna de aqua*. This strange disposition of the rivers is become the type of almost all the modern maps of Guyana. A misunderstanding, founded on ignorance of the Spanish language, has contributed to give great authority to the map of La Cruz, in which some accurate notions are mingled with systematic ideas drawn from ancient maps. A dotted line surrounds the country, respecting which Solano was able to procure some information; and this line has been taken for *Solano's route*, who consequently would have seen the south-western extremity of the White Sea. We

read on the map of La Cruz, " this line points out what has been discovered and pacified by the governor of Caraccas, don Jose Solano." It is well known in the missions, that Solano never left Fernando de Atabapo, that he did not see the Oroonoko east of the Guaviari, and that he could obtain no information respecting those countries but from common soldiers, who were ignorant of the language of the natives. The work of Father Caulin, who was the historiographer of the expedition, the testimony of don Apollinario Diez de la Fuente, and the voyage of Santos, sufficiently prove, that no person has ever seen the White Sea of La Cruz; which, as the names of the tributary streams indicate, is an imaginary enlargement of the western branch of the Rio Branco above the confluence of the Tacutu and the Uraricuera or Rio Parima. But, even admitting facts, the falsehood of which is sufficiently proved in the present day, it could scarcely be conceived from the hydrographic principles generally adopted, by what right the lake Ipava could be called the source of the Oroonoko. When one river runs into a lake, and three others issue from it, we know not to which of these rivers we ought to give the name of the former. Much less can any motive justify the geographer in preserving the same name for a river, the source of which is separated from the lake by a lofty chain of

mountains, and which is supposed to be the effect of a subterraneous infiltration.

Four years after the celebrated map of La Cruz Olmedilla appeared the work of father Caulin, who had accompanied the expedition of the boundaries. This book was written on the banks of the Oroonoko itself, in 1759; and some notes were added subsequently in Europe. The author, a monk of the Observance of Saint Francis, is distinguished by his candor, and by a spirit of criticism superior to that of all his predecessors. He did not go himself beyond the Great Cataract of Atures, but all that Solano and Ituriaga had collected, whether true or doubtful, was at his disposal. Two maps, traced by father Caulin in 1756, were reduced in 1778 into one, and completed, according to pretended discoveries, by Mr. de Surville, one of the keepers of the archives in the secretary of state's office. I have already observed, in speaking of our abode at Esmeralda, the point nearest the unknown sources of the Oroonoko, how arbitrary these alterations were. They were founded on the false reports, by which the credulity of the governor Centurion and of don Apollinario Diez de la Fuente, a cosmographer destitute of instruments, knowledge, and books, was daily flattered.

The journal of father Caulin is in perpetual contradiction with the map prefixed to it. The

author develops the circumstances, that gave rise to the fable of the lake Parima; but the map restores this lake, placing it however far from the sources of the Oroonoko, to the east of the Rio Branco. According to father Caulin, the Oroonoko is called Rio Maraguaca in the meridian of the granitic mountain of this name, which is figured on my itinerary map. "It is rather a torrent than a river; issuing conjointly with the Rio Omaguaca and the Macoma, in two degrees and a half of latitude, from the little lake Cabiya (Manomaname in Cabre, Caricha in Guaypunabi)." It is this lake, which La Cruz designated as the source of the Maquiritari (Padamo), and placed in latitude of five degrees and a half to the north of lake Ipava. The existence of the *Rio Macoma* of Caulin appears to be founded on a confused idea of the Padamo, the *Ocamo*, and the *Matacona*, which, before my travels, were believed to communicate together. Perhaps also the lake, from which the Mavaca issues (a little to the west of the Amaguaca), has given rise to these errors on the origin of the Oroonoko, and the neighbouring sources of the Idapa *.

Surville substitutes for the lake Parime of La Cruz another lake in the latitude of 2° 10′, which he regards as the source of the Ucamu *(Ocamo)*.

* *Caulin*. p. 51—82 See above, p. 376 and 558.

Near this alpine lake rise from the *same source* the Oroonoko and the Rio Idapa, a tributary stream of the Cassiquiare. The lake Amucu, the source of the Mahu, is enlarged into the *Mar Dorado*, or *Laguna Parime*. The Rio Branco is no longer connected, except by two of it's smallest tributary streams, with the basin, from which the Ucamu issues. It results from this arrangement, altogether hypothetical, that the origin of the Oroonoko is in no lake, and that it's sources are entirely independant of lake Parime and the Rio Branco. Notwithstanding the *bifurcated source*, the hydrographic system of Surville's map is less absurd, than that which is traced on the map of La Cruz. If modern geographers have so long persisted in following the Spanish maps, without comparing them together, we may at least be surprised, that they have not given the preference to the most modern map, that of Surville, published at the expense of the king, and by order of the minister for India, don Jose de Galvez.

I have now stated, as I announced above, the variable forms which geographical errors have assumed at different periods. I have explained what in the configuration of the soil, the course of the rivers, the names of the tributary streams, and the multiplicity of the *portages*, may have given rise to the hypothesis of an inland sea in the centre of Guyana. However dry discus-

sions of this nature may appear, they ought not to be regarded as steril and fruitless. They show travellers what remains to be discovered; and make known the degree of certainty, which long-repeated assertions may claim. It is with maps, as with those tables of astronomical positions, which are contained in our *ephemerides*, designed for the use of navigators: the most heterogeneous materials have been employed in their construction during a long space of time; and, without the aid of the history of geography, we could scarcely hope to discover at some future day on what authority every partial statement rests.

Before I resume the thread of my narrative, it remains for me to add a few general reflexions on the auriferous lands situate between the Amazon, and the Oroonoko. We have just shown, that the *fable of Dorado*, like the most celebrated fables of the nations of the ancient world, has been applied progressively to different spots. We have seen it advance from the south-west to the north-east, from the oriental declivity of the Andes towards the plains of Rio Branco and the Essequebo, an identical direction with that in which the Caribbees for ages conducted their warlike and mercantile expeditions. It may be conceived, that the gold of the Cordilleras might be conveyed from hand to hand, through an infinite number of tribes, as

far as the shore of Guyana; since, long before the fur-trade had attracted English, Russian, and American vessels to the north-west coast of America, iron tools had been carried from New Mexico and Canada beyond the *Stony Mountains*. From an error in longitude, the traces of which we find in all the maps of the 16th century, the auriferous mountains of Peru and New Grenada were supposed to be much nearer the mouths of the Oroonoko and the Amazon, than they are in fact. Geographers have the habit of augmenting and extending beyond measure countries that are recently discovered. In the map of Peru published at Verona by Paulo di Forlani, the town of Quito is placed at the distance of 400 leagues from the coast of the South Sea, on the meridian of Cumana; and the Cordillera of the Andes there fills almost the whole surface of Spanish, French, and Dutch Guyana*. This erroneous opinion

* *La Descrittione di tutto il Peru.* In this very scarce map Cumana is situate fifty leagues in land; the town of Quito in four degrees of south latitude; Pasto in the meridian of Surinam; and Cuzco south-west of Quito. A small alpine lake, which I saw between Otavalo and the Villa de Ibarra is marked on the spot where the *Laguna de Parime* is placed in modern maps. When the Spaniards began to penetrate into Guyana, proceeding from the east, the names of places near the South Sea were transferred toward the west. Sanson also (1669) calls the country between the Meta and the Guaviare the *Province of Paria.*

of the breadth of the Andes has no doubt contributed to give so much importance to the granitic plains, that extend on their eastern side. Unceasingly confounding the tributary streams of the Amazon with those of the Oroonoko*, or (as the lieutenants of Raleigh called it to flatter their chief) the *Rio Raleana*, to the latter were attributed all the traditions, which had been collected respecting the Dorado of Quixos, the Omaguas, and the Manaos†. The geographer

* The Amazon was confounded with the Oroonoko at the same period when other geographers distinguished between the Amazon, the Orellana, and the Maragnon. "Fluvius *Orenoque* Andalusiam novam a Gujana dirimens, alias ab Hispanis *Orellana* vocatus fuit." (*Blaeuw*, p. 17.)

† In the map of P. du Val d'Abbeville (No. 9561 of D'Anville's collection, preserved in the archives of the Ministry of Foreign Affairs), we read, near the lake Parime, *Orejones* (nobles of Peru), and *Establishment of the Incas*. See also *Description générale de l'Amérique par Pierre d'Avity, seigneur de Montmartin, revue par J. B. de Rocoles*, 1660, p. 136.) The flight of Manco-Inca, brother of Atahualpa, to the east of the Cordilleras, no doubt gave rise to the tradition of a new empire of the Incas in Dorado. It was forgotten, that Caxamarca and Cuzco, two towns where the princes of that unfortunate family were at the time of their emigration, are situate to the south of the Amazon, in the latitudes of seven degrees eight minutes and thirteen degrees twenty-one minutes south, and consequently four hundred leagues south-west of the pretended town of Manoa on the lake Parima (three degrees and a half north lat.). It is probable, that, from the extreme difficulty of penetrating into the plains east of the Andes covered with forests, the fugitive princes never

Hondius supposed, that the Andes of Loxa, celebrated for their forests of cinchona, were

went beyond the banks of the Beni. The following is what I learnt with certainty respecting this emigration of the family of the Inca, some sad vestiges of which I saw on passing by Caxamarca. *Manco-Inca*, acknowledged as the legitimate successor of Atahualpa, made war without success against the Spaniards. He retired at length into the mountains and thick forests of Vilcabamba, which are accessible either by Huamanga and Antahuaylla, or by the valley of Yucay north of Cuzco. Of the two sons of *Manco-Inca*, the eldest, *Sayri-Tupac*, surrendered himself to the Spaniards, upon the invitation of the viceroy of Peru, Hurtado de Mendoza. He was received with great pomp at Lima, was baptized there, and died peaceably in the fine valley of Yucay. The youngest son of Manco-Inca, *Tupac-Amaru*, was carried off by stratagem from the forests of Vilcabamba, and beheaded on pretext of a conspiracy formed against the Spanish usurpers. At the same period, thirty five distant relations of the Inca Atahualpa were seized, and conveyed to Lima, in order to remain under the inspection of the *Audiencia*. (*Garcilasso*, Vol. 2, p. 194, 480, and 501.) It is interesting to inquire, whether any other princes of the family of Manco-Capac have remained in the forests of Vilcabamba, and if there still exist any descendants of the Incas of Peru between the Apurimac and the Beni. This supposition gave rise in 1741 to the famous rebellion of the Chuncoes, and to that of the Amajes and Campoes led on by their chief, Juan Santos, called the false Atahualpa. The late political events of Spain have liberated from prison the remains of the family of Jose Gabriel Condorcanqui, an artful and intrepid man, who, under the name of the Inca *Tupac-Amaru*, attempted in 1781 that restoration of the ancient dynasty, which Raleigh had projected in the time of queen Elizabeth.

only twenty leagues distant from the lake Parima, or the banks of the Rio Branco. This proximity procured credit to the tidings of the flight of the Inca into the forests of Guyana, and the removal of the treasures of Cuzco to the easternmost parts of that country. No doubt in going up toward the east, either by the Meta or by the Amazon, the civilization of the natives, between the Puruz, the Jupura, and the Iquiari, was observed to increase. They possessed amulets, little idols of molten gold, and chairs sculptured with art; but these traces of dawning civilization are far distant from those cities and houses of stone described by Raleigh and those who followed him. We have made drawings of some ruins of great edifices east of the Cordilleras, when going down from Loxa toward the Amazon, in the province of Jaen de Bracamoros; and thus far the Incas had carried their arms, their religion, and their arts. The inhabitants of the Oroonoko were also, before the conquest, when abandoned to themselves, somewhat more civilized than the independant hordes of our days. They had populous villages along the river, and a regular trade with more southern nations; but nothing indicates, that they ever constructed an edifice of stone. We saw no vestige of any during the course of our navigation.

Though the celebrity of the riches of Spanish

Guyana is owing for the most part to the geographical situation of the country, and the errors of the ancient maps, we are not justified in denying the existence of any auriferous land in that extent of country of eighty-two thousand square leagues, which stretches between the Oroonoko and the Amazon, on the east of the Andes of Quito and New Grenada. What I saw of this country between two and eight degrees of latitude, and sixty-six and seventy-one degrees of longitude, is entirely composed of granite, and of a gneiss passing into micaceous and talcous slate. These rocks appear naked in the lofty mountains of Parima, as well as in the plains of the Atabapo and the Cassiquiare. The granite prevails there over the other rocks; and, though in both continents the *granite of ancient formation* is pretty generally destitute of gold-ore, we cannot thence conclude, that the granite of Parima contains no vein, no stratum of auriferous quartz. On the east of the Cassiquiare, toward the sources of the Oroonoko, we saw the number of these strata and these veins increase. The granite of these countries, by it's structure, it's mixture of hornblende, and other geological features alike important, appears to me to belong to a more recent formation, perhaps posterior to the gneiss, and analogous to the stanniferous granites, the hyalomictes, and the pegmatites. Now the least

ancient granites are also the least destitute of metals; and several auriferous rivers and torrents in the Andes, in the Salzbourg, Fichtelgebirge, and the tableland of the two Castiles, lead us to believe, that these granites sometimes contain native gold, and portions of auriferous pyrites and galena disseminated throughout the whole rock, as is the case with tin, and magnetic and micaceous iron. The group of the mountains of Parima, several summits of which attain the height of one thousand three hundred toises*, was almost entirely unknown before our visit to the Oroonoko. This group however is a hundred leagues long, and eighty broad; and though wherever Mr. Bonpland and I traversed this vast group of mountains, it's structure seemed to us extremely uniform, it would be wrong to affirm, that it may not contain very metalliferous *transition rocks* and micaslates superimposed on the granite.

I have already observed, that the silvery lustre and frequency of mica have contributed to give Guyana great celebrity for metallic wealth. The peak of Calitamini, glowing every evening

* The loftiest mountains, which have hitherto been measured in Brazil, are only nine hundred toises high; such are, Itacolumi, in the Capitania of Minas-Geraes (near Villarica), the Serra d'Itambe, the Serra de Caras, &c. See the excellent memoirs of M. d'Eschwege. (*Journ. von Brasilien*, 1818, Vol. 1, p. 213).

at sunset with a reddish fire, still attracts the attention of the inhabitants of Maypures *. It is the islets of micaslate, situate in lake Amucu, which according to the fabulous stories of the natives augment by their reflexion the lustre of the nebulæ of the southern sky †. "Every mountain," says Raleigh, "every stone in the forests of the Oroonoko, shines like the precious metals; if it be not gold, it is *madre del oro*." This navigator asserts, that he brought back *gangues* of auriferous white quartz ("harde white sparr"); and to prove the richness of this ore, he gives an account of the assays, that were made by the officers of the mint at London ‡. I have no reason to believe, that the chemists of that time sought to lead queen Elizabeth into error, and I will not insult the memory of Raleigh by supposing, like his contemporaries §, that the auriferous quartz, which he brought home, had not been collected in America. We cannot judge of things from which we are separated by a long interval of time. The gneiss of the *littoral chain* ‖ contains traces of the precious

* See above, p. 167.

† See above, p. 838.

‡ Messrs. Westewood, Dimocke, and Bulmar.

§ See the defence of Raleigh, in the preface to the Discovery of Guiana, 1596, p. 2—4.

‖ In the southern branch of this chain, which passes by Yusma, Villa de Cura, and Ocumare; particularly near

metals; and some grains of gold have been found in the mountains of Parima, near the mission of Encaramada. How can we infer the absolute sterility of the primitive rocks of Guyana from testimony merely negative, from the circumstance, that during a journey of three months we saw no auriferous vein appearing above the soil?

In order to bring together whatever may enlighten the government of this country on a subject so long disputed, I shall enter into a few more general geological considerations. The mountains of Brazil, notwithstanding the numerous traces of imbedded ore which they display between Saint Paul and Villarica, have furnished hitherto only stream-works of gold. More than six sevenths of the seventy-eight thousand marks* of this metal, which at the beginning of the 19th century America has annually furnished to the commerce of Europe, have come, not from the lofty Cordillera of the Andes, but from the alluvial lands on the east and west of the Cordilleras. These lands are raised but little above the level of the sea, like those of Sonora in Mexico, and of Choco and Barbacoas in New Grenada; or they stretch along in tablelands, as in the interior of Bra-

Buria, los Teques, and los Marietus. See above, Vol. iii, p. 525, 529.

* Value 65,878,000 franks.

zil*. Is it not probable, that some other depositions of auriferous earth extend toward the northern hemisphere, as far as the banks of the Upper Oroonoko and the Rio Negro, two rivers which form but one basin with that of the Amazon? I observed, when speaking of the Dorado de Canelas, the Omaguas, and the Iquiare, that almost all the rivers, which flow from the west, wash down gold in abundance, and very far from the Cordilleras. From Loxa to Popayan these Cordilleras are composed alternately of trachytes and primitive rocks. The plains of Zamora, of Logrono, and of Macas (Sevilla del Oro), the great Rio Napo with it's tributary streams† (the Ansupi and the Coca,

* The height of Villarica is six hundred and thirty toises; but the great tableland of the Capitania de Minas Geraes has only three hundred toises of absolute height. See the profile, which Colonel d'Eschwege has published at Weimar, with an indication of the rocks, in imitation of my profile of the Mexican tableland.

† The little rivers Cosanga, Quixos, and Papallacta or Maspa, which form the Coca, rise on the eastern slope of the *Nevado de Antisana*. The Rio Ansupi brings down the largest grains of gold; it flows into the Napo, south of the Archidona, above the mouth of the Misagualli. Between the Misagualli and the Rio Coca, in the province of Avila, five other northern tributary streams of the Napo (the Siguna, Munino, Suno, Guataracu, and Pucuno) are known as being singularly auriferous. These local details are taken from several manuscript reports of the governor of Quixos, from which I traced the map of the countries situate to the east of the Antisana.

in the province of Quixos), the Caqueta de Mocoa as far as the mouth of the Fragua, in fine, all the country comprised between Jaen de Bracomoros and the Guaviare*, preserve their ancient celebrity for metallic wealth. More to the east, between the sources of the Guainia (Rio Negro), the Uaupes, the Iquiare, and the Yurubesh, we find an incontestibly auriferous soil. There Acunha and father Fritz placed their *Laguna del Oro;* and various accounts, which I obtained at San Carlos from Portugueze Americans, explain perfectly what La Condamine has related of the plates of beaten gold found in the hands of the natives. If we pass from the Iquiari to the left bank of the Rio Negro, we shall enter a country entirely unknown between the Rio Branco, the sources of the Essequebo, and the mountains of Portugueze Guyana. Acunha speaks of the gold washed down by the northern tributary streams of the Lower Maragnon, such as the Rio Trombetas (Oriximina), the Curupatuba, and the Ginipape (Rio de Paru). It appears to me a circumstance worthy of attention, that all these rivers descend from the same tableland, the northern slope of which contains the lake *Amucu*, the Dorado of Raleigh and the Dutch, and the isthmus between the Rupunuri (Rupunuwini) and the Rio Mahu. Nothing opposes our admitting, that there are

* From Rio Santiago, a tributary stream of the Upper Maragnon, to the Llanos of Caguan and of San Juan.

auriferous alluvial lands far from the Cordilleras of the Andes, on the north of the Amazon; as there are on the south, in the mountains of Brazil. The Caribbees of the Carony, the Cuyuni, and the Essequebo have practised on a small scale the washing of the alluvial earth from the remotest times*. When we examine the structure of mountains, and embrace in one point of view an extensive surface of the globe, distances disappear, and places the most remote draw near each other insensibly. The basin of the Upper Oroonoko, the Rio Negro, and the Amazon, to which I have consecrated the whole of the eighth book of my work, is bounded by the mountains of Parime on the north, and by those of Minas-Geraes, and Matogrosso on the south. The opposite slopes of the same valley often display an analogy in their geological relations.

I have described in this and the preceding volume the vast provinces of Venezuela and Spanish Guyana. While examining their natural limits, their climate, and their productions, I have discussed the influence produced by the configuration of the soil on agriculture, commerce, and the more or less rapid progress of society. I have successively passed over the three regions that succeed each other from north to south; from the Mediterranean of the West

* See note A, at the end of this volume.

Indies to the forests of the Upper Oroonoko and of the Amazon. The fertile land of the shore, the centre of agricultural riches, is succeeded by the steppes, inhabited by pastoral tribes. These steppes are in their turn bordered by the region of forests, the inhabitants of which enjoy, I will not say liberty, which is always the result of civilization, but a savage independance. On the limit of these two latter zones the struggle now exists, which will decide the emancipation and future prosperity of America. The changes which are preparing cannot efface the individual character of each region; but the manners and condition of the inhabitants will assume a more uniform colour. This consideration perhaps adds an interest to a tour, made in the beginning of the 19th century. We like to see traced in the same picture the civilized nations of the shore, and the feeble remains of the natives of the Oroonoko, who know no other worship than that of the powers of nature; and who, like the Germans of Tacitus, *deorum nominibus appellant secretum illud, quod solâ reverentiâ vident.*

NOTE TO BOOK THE EIGHTH.

NOTE A.

" On the north of the confluence of the Curupatuba with the Amazon," says Acunha (p. 40), " is the mountain of Paraguaxo, which, when illumined by the sun, glows with the most beautiful colours; and thence from time to time issues a horrible noise (*revienta con grandes estruenos*)." Is there a volcanic phenomenon in this *eastern* part of the New Continent? or is it the love of the marvellous, which has given rise to the tradition of the bellowings (*bramidos*) of Paraguaxo? The lustre emitted from the sides of the mountain recalls to mind what we have mentioned above of the micaceous rocks of Calitamini, and the island Ipomucena, in the pretended *lake Dorado*. In one of the Spanish letters intercepted at sea by Captain George Popham, in 1594, it is said, " Having inquired of the natives, whence they obtained the spangles and powder of gold, which we found in their huts, and which they stick on their skin by means of some greasy substances, they told us, that, in a certain plain, they tore up the grass, and gathered the earth in baskets, to subject it to the process of washing." (*Raleigh*, p. 109.) Can this passage be explained by supposing, that the Indians sought thus laboriously, not for gold, but for spangles of mica, which the natives of Rio Caura still employ as an ornament, when they paint their bodies?

END OF VOL. V.

ERRATA.

Vol. IV.

Page 225, add as a note to gelatine, l. 10, Philos. Trans. 1800, p. 163.

466, l. 7 from bottom, *for* Panama, *read* Panapana.

550,...2..... Uruana. .... Carichana.

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216,...11.....*for* Aroma.....*read*...Aramo.

309,... 7.... ..... estacamentos ..... destacamento.

312,...10..... west .....east.

17..... north-east .....north-west.

This volume terminates the second volume (in *Quarto*) of the Personal Narrative. Each volume of this work appears in two parts; to the last will be annexed a very copious Table of Contents, in which the physical and geological observations will be methodically arranged. It may not be amiss, to take this opportunity of stating, that eighteen volumes of the large edition of the *Voyage to the Equinoxial Regions of the New Continent* have now appeared, eleven of which are in quarto. There remain to be published, 2 Vols. (in *quarto*) of the Personal Narrative, 1 Vol. of Zoology, 2 Vols. of the *Nova Genera et Species Plant. æquin.*, the *Magnetical Observations*, and the new edition of the *Geography of Plants*.

The sketches of maps cited in the discussion on lake Parima, (p. 839 to 859 of the present volume), will appear in the next number of the Geographical Atlas. The map of the Rio Grande de la Magdalena, containing a considerable part of New Grenada, is the result of the astronomical observations and barometric measurements, which I made during a navigation of sixty-five days. I drew this map on a very large scale, in the month of August, 1801, during my residence at Santa-Fe de Bogota. It is the first map of the River Magdalena constructed astronomically. Copies of it were left in the hands of the viceroy, and of the celebrated botanist, Mr. Mutis; other copies were sent to Carthagena and to Spain. Having given this map to be engraved in 1816, I could not avail myself of the topographic particulars of the islands and the sinuosities of the river, which are found in the Spanish map published at London, in the month of September, 1820, by lieutenant-colonel Don Vicente Talledo, entitled, *Mapa corografico de la Provincia de Cartagena de Indias*. This curious map comprehends the half of the Rio Magdalena, from it's mouth as far as the Strait of Carare. The court of Madrid, informed of my geographical labors, by the viceroy, don Pedro de Mendinueta, was desirous of having the degree of their precision ascertained on the spot.

Mr. Talledo, and a skilful pilot, Mr. Alvarez, were appointed in 1804, to take the plan of the Magdalena from the mouth as far as Honda. I know, that they made use, like me, of sextants, and artificial horizons; but I am ignorant whether they were also furnished with chronometers. The map of the province of Carthagena by Mr. Talledo is the result of these long and useful operations. I had marked on the drawing, copies of which were left at New Grenada, a table of latitudes and longitudes, determined between Turbaco and Santa-Fe de Bogota. In examining these particular points on Mr. Talledo's map, the following comparison is the result:

PLACES. The longitudes are reduced to the Meridian of la Popa de Cartagena de Indias, which is 1′ 25″ east of the port.	MAP of Mr. de Humboldt, drawn at Santa-Fe, in 1801.		MAP of Mr. Talledo, taken in 1804.	
	Lat.	Long.	Lat.	Long.
Turbaco	.....	0° 6′	.....	0° 5′ 1/4
Mahates	.....	0 22	.....	0 21 1/2
Island of Cotoreo.	.....	1 39	.....	1 37
Pinto	9° 25′	0 58 1/2	9° 25′	0 58
Mompox	9 14	1 8	9 15	1 8 1/2
Badillas (Vadillo).	7 58	1 41	7 57	1 39
Island of Bruxas.	6 55	1 42	6 55	1 41 3/4
Cararc	.....	1 5	.....	1 4 1/2
Narc	6 11	1 3	6 11	1 2 1/2

This agreement in the results is so much the more remarkable, as it comprises every point of which I fixed the longitude from Turbaco to Narc. Does it prove the exactness of my labours? or has Mr. Talledo (without any indication of it on his map) preferred my observations to his own? If the latter be the case, I regret that he adopted calculations made provisionally in 1801, instead of the positions published by

Mr. Oltmanns and me in 1811, in my *Collection of Astronomical Observations*, Vol. 1, p. 20. A more profound examination of the declination of the southern stars, and of the rate of the chronometer, necessarily modified the latitudes and longitudes a little; so that on the map engraved in 1816, by Mr. Michaelis, the longitudes of Pinto and the Island of Bruxas are 0° 47′ and 1° 34′. The profile of the land between Honda and the tableland of Bogota is founded on the barometric observations, which I have published in my *Nivellement des Andes*, No. 64-130.

ALEXANDRE DE HUMBOLDT.

Paris, March, 1821.

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